

ANATOMY

NEET PG - 2018

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ANATOMY

(2)

SUPERIOR EXTREMITY

The Pectoral Region

Pectoralis Major

Origin \Rightarrow Medial 2/3rd of the clavicle;
 Manubrium & Body of sternum;
 2nd-6th costal cartilage;
 External oblique aponeurosis;

Insertion \Rightarrow Lateral lip of Bicipital groove of Humerus

Action \Rightarrow Adduction
 Flexion
 Medial Rotation (at the shoulder joint)

N. Supply \Rightarrow Medial & Lateral Pectoral Nerve (Composite/Hybrid Nerve)

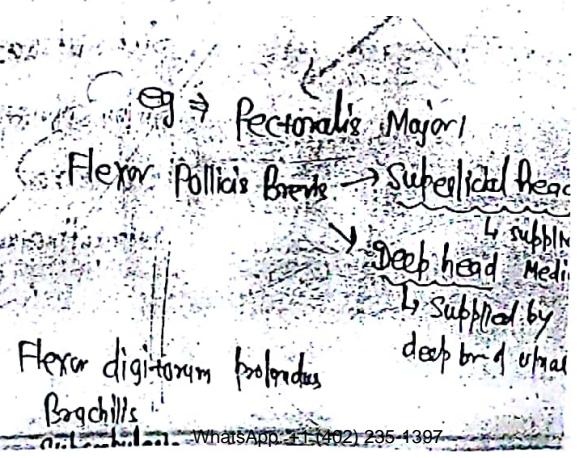
Blood supply \Rightarrow Superior thoracic A.
 Lateral thoracic A.
 Thoracodorsal A.
 Perforating branch of internal thoracic A
 Anterior intercostal A.

Q) M/c muscle to be congenitally absent

Pectoralis Major (Poland Syndrome)
 (Stemocostal part).

Cruciate Muscle

Muscle fibre cross in letter "X"
 \Rightarrow Pectoralis Major;
 Sternocleidomastoid;
 Masseter.



Lesser tubercle of Humerus \Rightarrow "Subscapularis" Muscle attaches
 \Downarrow
Medial Rotation @ shoulder joint

Greater tubercle of Humerus \Rightarrow

① Supraspinatus \Rightarrow Abduction (0° to 15°)

② Infraspinatus \Rightarrow } Lateral Rotation

③ Teres Minor \Rightarrow }

④ Coracobrachialis Ligament

(\ominus)

Forgotten Muscle of Rotator cuff \Rightarrow Subscapularis

Lateral lip of Bicipital groove \Rightarrow Pectoralis Major

Medial lip of Bicipital groove \Rightarrow Teres Major Attaches

floor of the V Bicipital groove \Rightarrow Lattissimus dorsi

• Long head of biceps brachii \in the synovial sheath of shoulder joint

• Ascending branch of Anterior circumflex humeral Artery

Rotator cuff \Rightarrow

Subscapularis

Supraspinatus

Teres Minor

Sublatisimus - (Main muscle to be damaged in Rotator cuff)

DELTOID

Anterior fibres | Clavipectoral fibres

Acromial fibres | Middle fibres

Posterior fibres

↓
Flexion &

Medial Rotation

③ Shoulder joint

↓

Extension &

Lateral Rotation,
③ Shoulder joint

Abduction from 15-90°

- Axillary Nerve Supplies — Deltoid

Teres Minor

- gives some cutaneous branch

Upper Lateral cutaneous N. of Arm

↳ "Regimen branch sign"

Abduction @ shoulder joint

0°-15° / Initiation of Abduction ⇒ Supraspinatus

15°-90° ⇒ Acromial fibres of deltoid

90° or above / overhead Abduction ⇒ Serratus Anterior

Trapezius (Lower fibres)

Lateral Rotation of Scapula

SERRATUS ANTERIOR (Boxer Muscle)

Origin - Arises from the Lateral aspect of Upper 8 Ribs as digitation

Insertion - Costal aspect Medial border of the Scapula

Action - Pronation of Scapula
↳ it means "Abduction"

N. Supply - Long Thoracic Nerve / N. to Serratus Anterior

Q: Winging of Scapula is due to paralysis of \Rightarrow

Serratus Anterior (on attempting Movement)
Trapezius (@ Rest)

Q: Retraction of Scapula is done by \Rightarrow

Rhomboides Minor

Rhomboides Major

Middle fibres of Trapezius.

(a, b, c, d, e)

True about Abduction @ shoulder joint -

- a. Musculotendinous cuff stabilizes Shoulder Joint
- b. Subscapularis Initiates Abduction
- c. Serratus Anterior & Trapezius also help in Abduction
- d. Multi pennate deltoid clavicular fiber is Main Abductor
- e. Axillary N injury has No effect on Abduction

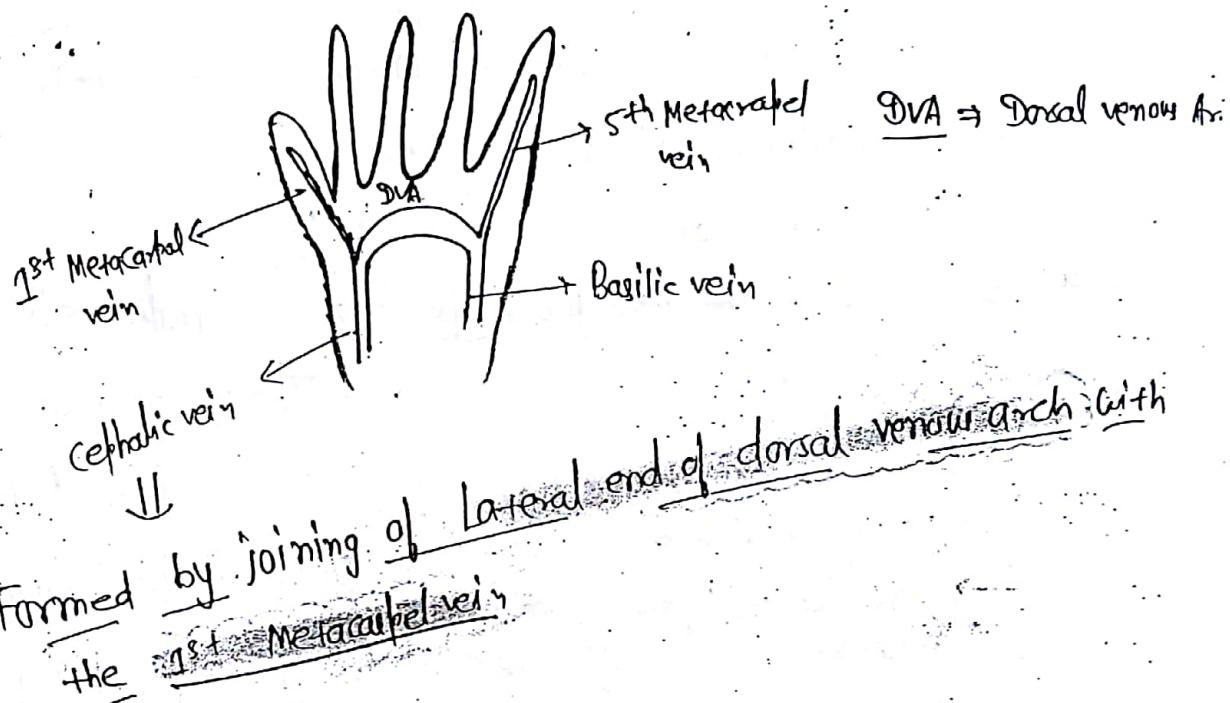
Structure lying in Deltpectoral groove

Cephalic vein

Structure lying in the ilio-pectoral groove \Rightarrow Femoral Nerve

Structure lying in the Tracheo-oesophageal groove \Rightarrow Recurrent Laryngeal Nerve

Cephalic vein



Lies in the Roof of Anatomical Snuff box.

Lies in deltopectoral groove

Pierces the clavicle

Drain into the Axilla

Basilic vein

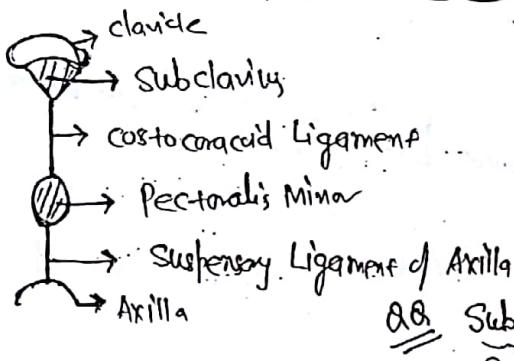
- Formed by joining of Medial end of dorsal venous arch & the 5th Metacarpal vein.
- It joins C Vene comitans (of a vein) around the brachial artery forming axillary vein.

V.V.O

Clavi-pectoral fascia

- begins from the clavicle & inserted into the Axilla;
- encloses 2 Muscle
 - Subclavius
 - Pectoralis Minor
- Part of fascia b/w Subclavius & Pectoralis Minor is Klaas "costo-coracoid Ligament"
- Part b/w Pectoralis & the axilla is Klaas "Suspensory Ligament"
- derived from "costo-coracoid Ligament"

Structure piercing the clavi-pectoral fascia \Rightarrow



• Cephalic vein

• Thoraco-acromial Artery

• Lateral Pectoral Nerve

• Lymphatics from breast

Q.B. Subclavius protects underlying brachial plexus & subclavian vessels from a broken clavicle.

Coracoclavicular Ligament \Rightarrow two parts

conoid (Medial)

strapoid (Lateral)

The weight of upper limb is transmitted to the medial 2/3rd of the clavicle & then to the axial skeleton through coracoclavicular Ligament.

THE AXILLA

(5)

Boundaries →

Anterior wall

Pectoralis Major

Pectoralis Minor

Subclavius

Posterior wall

Subscapularis

Teres Major

Lattissimus dorsi

(Causes extension & Adduction)

Medial Rotation @ the Shoulder joint

- also known "Climber's Muscle"

Medial wall

Ribs

Serratus Anterior

Lateral wall

Humerus

Coracobrachialis

Apex of A

Anteriorly

↳ clavicle

- axillary canal

Medial

↳ outer border of 1st Rib

Posteriorly

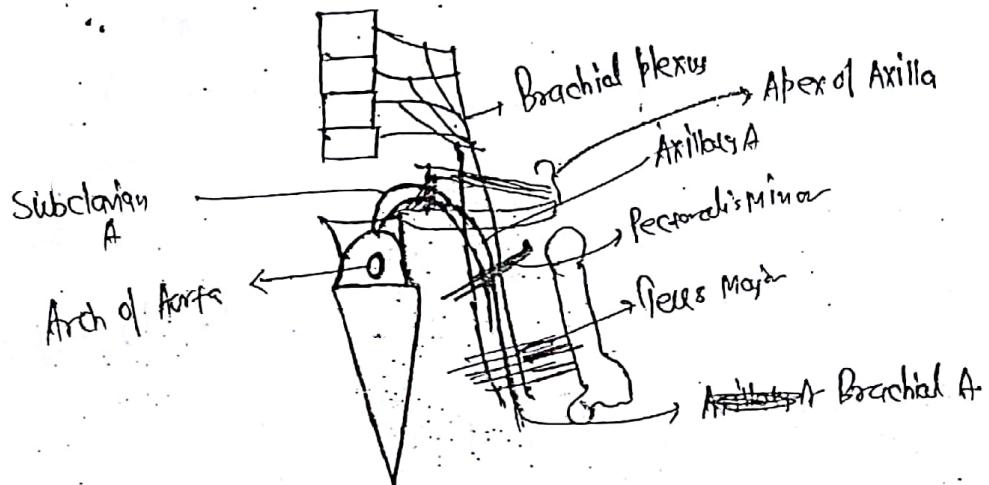
↳ Scapula (subscapularis)

* Axillary A. is divided into 3 parts by \Rightarrow Pectoralis Minor Muscle

Subclavian A. is divided into 3 parts by \Rightarrow Scalenus Anterior Muscle

Maxillary A. is divided into 3 parts by \Rightarrow Lateral Pterygoid Muscle

Lingual A. is divided into 3 parts by \Rightarrow Hyoglossus Muscle



Axillary Artery

Continuation of the Subclavian Artery at outer border of the 1st Rib

continues as Brachial Artery below the lower border of Teres Major

Divided into 3 parts by Pectoralis Minor

- Branches \Rightarrow 1st part \Rightarrow Superior thoracic A.

2nd part \Rightarrow Lateral thoracic A
(chief A supplying the breast)

Thoracocervical A.

11

Subscapular A. \Rightarrow Anterior circumflex humeral A. Both form

Posterior circumflex humeral A. Anastomosis
Ground surgical
Neck

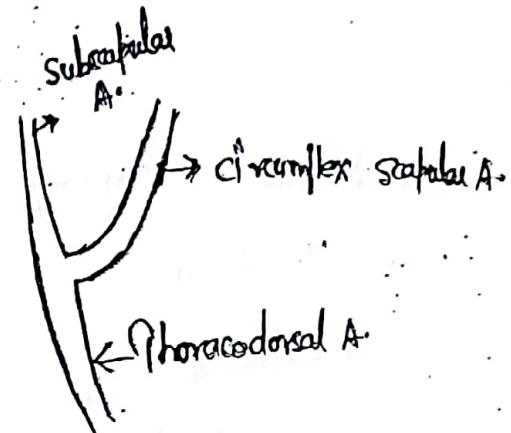
Subscapular A.

It gives branches.

Circumflex scapular A.



Passes through
Upper A. Space & takes
part in Anastomosis
on the dorsal aspect
of Scapula.



Continuation of Subscapular A. \Rightarrow Thoracodorsal A.

Accompanies the thoracodorsal N. / N. f.
Latin: dor

Anastomosis on the dorsal aspect of Scapula.

Subclavian

1st Part

Subscapular A.

Deep branch of

Transverse cervical A.

Axillary

3rd Part

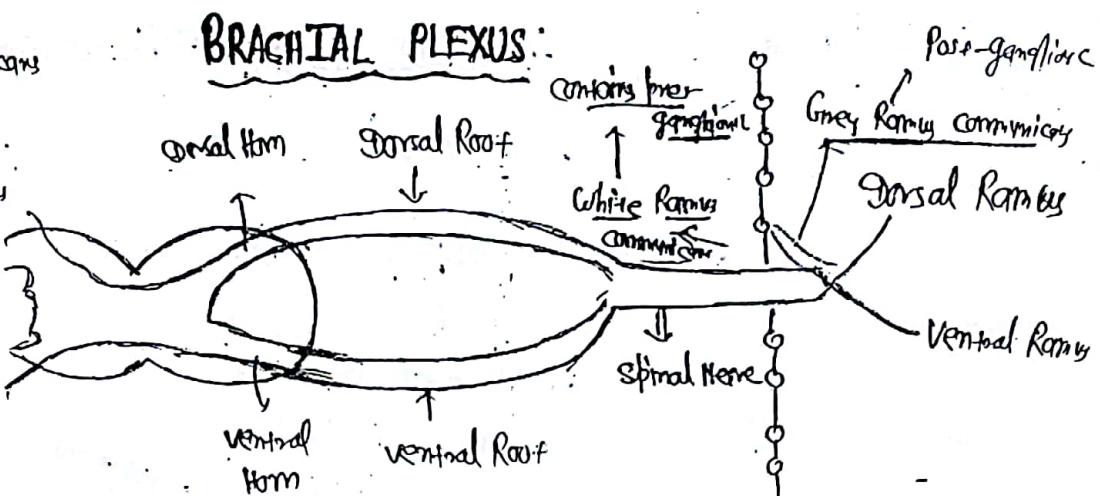
Subscapular / Circumflex scapul.

White Ramus communicans

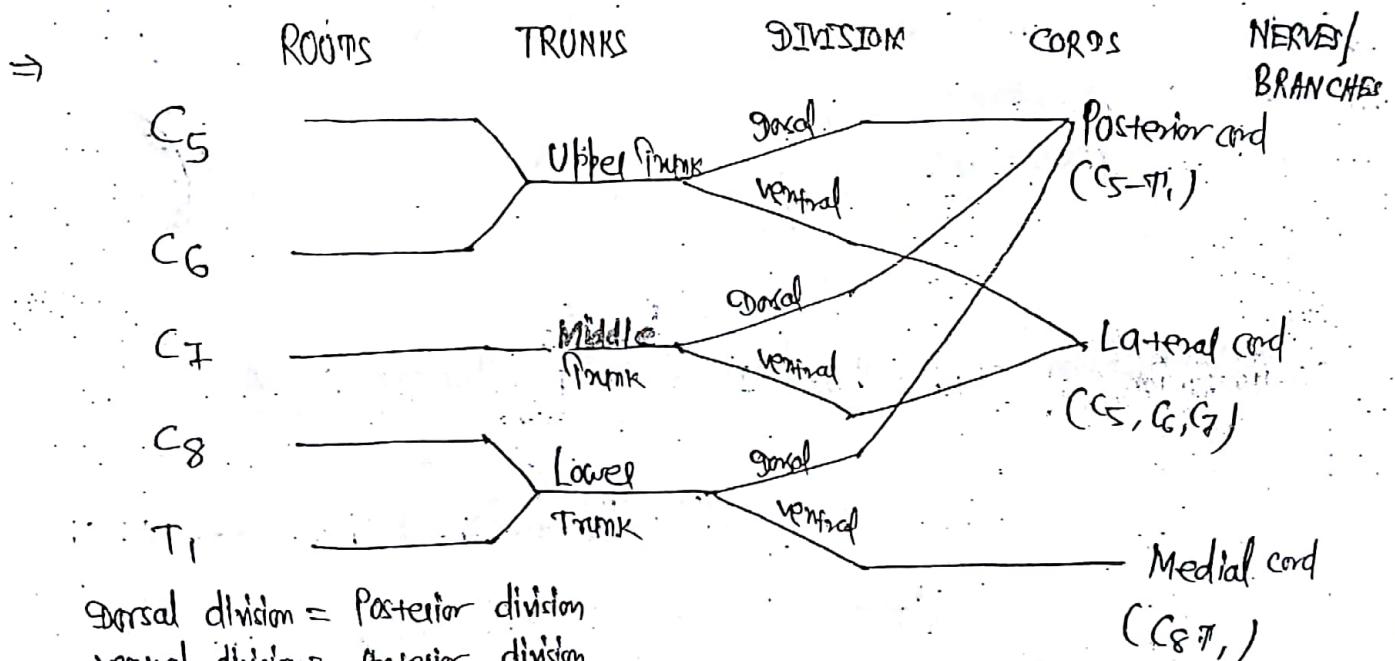
④ In T₁-L₂

Grey Ramus communicans

④ In all the spinal nerves



→ A plexus is formed by Ventral Ramus of the corresponding spinal nerve.



Branches of Lateral cord →

① Lateral Pectoral N. (C₅, C₆, C₇)

② Lateral Root of Median N. (C₅, C₆, C₇)

③ Musculocutaneous N. (C₅, C₆, C₇)

↓ Damage to Musculocutaneous Nerve:

a) Weakness of flexion of elbow

b) Loss of extension of semilunar elbow

c) Sensory loss along the lateral border of forearm

Branches of Medial cord \Rightarrow

① Medial Pectoral N. (C_8, T_1)

(7)

② Medial Root of Median N. (C_8-T_1)

③ Medial cutaneous N. of Arm (C_8-T_1)

④ Medial cutaneous N. of Forearm (C_8-T_1)

⑤ Ulnar Nerve (C_7, C_8, T_1)

Branches of Posterior cord \Rightarrow

"ULNAR"

① Upper Subscapular N.

supplies subscapularis only

② Lower Subscapular N.

C_5, C_6

supplies subscapularis & Teres Major

③ Axillary N.

supplies both Teres Minor & Deltoid

④ N. to Latissimus dorsi / Thoracodorsal N. (C_6, C_7, C_8)

⑤ Radial Nerve ($C_5 - T_1$)

Largest branch of Brachial plexus

Q: Root value of Median Nerve \Rightarrow (C_5, C_6, C_7, C_8, T_1) (C_5-T_1)

Branches from the Roots

C_5 Root \Rightarrow N. to Rhomboids / Dorsal scapular Nerve

C_5, C_6, C_7 Root \Rightarrow N. to Serratus Anterior / Long thoracic Nerve (C_3, C_4, C_5)

C_5 Root \Rightarrow Accessory Phrenic Nerve (Joins the Main Phrenic through N. to Subclavian)

C_5, C_6 Roots \Rightarrow N. to Subclavius

Branches from Upper trunk

- ① Supra Scapular Nerve - supplies Subraspinatus & Infraspinatus
- ② N. to Subclavius (occasionally from Roots of C5, C6)

* Roots; trunks; & divisions are \Rightarrow Subclavicular
 ↓

Lies in Posterior triangle of the Neck between the Scalenus Anterior & Scalenus Medius.

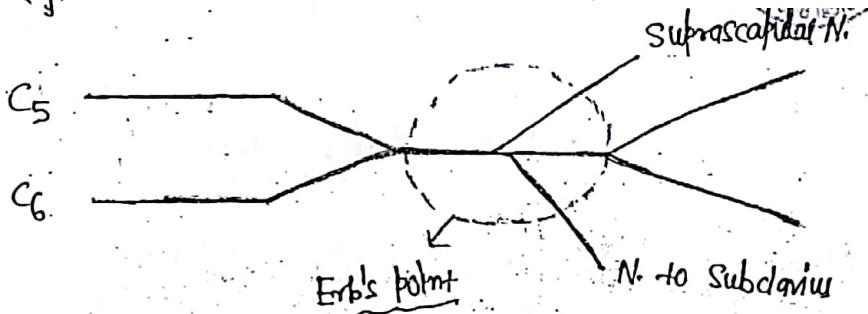
* Cords & Nerves are \Rightarrow Infraclavicular
 ↓

Lies in the Axilla around the axillary artery.

* Cords are present in the 1st & 2nd part; Nerves are present in 3rd part of Axillary Artery.

* Cords are placed in Afc to their Name in 2nd part of Axillary artery.

Erb's point \Rightarrow



- * Pre-fixed Brachial plexus \Rightarrow Formed from C4-8 spinal nerve
- * Post-fixed Brachial plexus \Rightarrow Formed from C6-8, T1-2 spinal nerve

FRONT OF THE ARM / FRONT OF THE BRACHIUM

Muscles

⇒ 1. Biceps brachii

Short head - Arises from Coracoid process along with Coracobrachialis.

Long head

Arises from Subscapularis ~~ribcicle d.~~
Scapula.

Insertion ⇒ Posterior aspect of Radial tuberosity

N. Supply ⇒ Musculocutaneous Nerve (C₅, C₆)

No + G (X)

Action ⇒

Subinator @ RadioUlnar joint

Flexion @ elbow joint

Flexion @ shoulder joint

* Subinatior in extended elbow

↓
Subinator

* Subinatior in flexed elbow

↓
Biceps brachii

2. Brachialis ⇒ Arises from the shaft of humerus below the insertion of Coracobrachialis

Insertion ⇒ Ulnar tuberosity.

N. Supply ⇒ Medial half ⇒ Musculocutaneous N. (C₅, C₆)

Lateral half ⇒ Radial N. (C₇, C₈)

Action ⇒

Chief flexor of the elbow joint.

3. Coracobrachialis \Rightarrow Arises from the coracoid process along with the short head of biceps brachii.

Insertion \Rightarrow Medial aspect of middle of shaft of the humerus.

N. Supply \Rightarrow Musculocutaneous Nerve (C_5, C_6, C_7)

Action \Rightarrow Weak flexors of the shoulder joint.

*~~Q~~ Paralysis after injury to C_5, C_6 except \Rightarrow Coracobrachialis

Musculocutaneous Nerve

Branch of Lateral cord of Brachial plexus.

Prf. on the Lateral aspect of 3rd part of Axillary A.

- pierces the Coracobrachialis.
- Lies b/w biceps & Brachialis.
- continues as the Lateral cutaneous N. of Forearm.

ERB's PARALYSIS

\rightarrow Injury to the upper trunk

N. Roots involved $\Rightarrow C_5, C_6$

- Nerves involved \Rightarrow Axillary N.

Musculocutaneous N.

Subscapular N.

N. to Subclavius

Muscle ParalysedPosition of upper limb

① Axillary Nerve \Rightarrow Deltoid \rightarrow Arm is adducted

Terr Minor \rightarrow Arm is Medially Rotated
 \downarrow

"Regiment batoh sign"

② Musculocutaneous Nerve \Rightarrow Biceps \rightarrow Forearm is pronated

Brachialis \rightarrow Forearm is extended

- Loss of sensation on Lateral aspect of forearm.

* "Coraco-brachialis" is spared b/c it is supplied by C7 of Musculocutaneous

③ Subscapular N. \Rightarrow Supraspinatus \rightarrow Arm is adducted

Infraspinatus \rightarrow Arm is Medially Rotated

KLUMPKE'S PARALYSIS

- Injury to Lower trunk

- N. Roots involved \Rightarrow C8 T1

- N. Involved \Rightarrow Median & Ulnar N.

- Muscle Paralysed \Rightarrow Intrinsic Muscle of Hand (T1)

Ulnar flexors of the wrist & fingers (C8)

- claw hand & Horner syndrome

\hookrightarrow Flexor carpi ulnaris & Medial hd.

Flexor digitorum profundus

FRONT OF THE FOREARM.

(Lateral to Medial) SUPERFICIAL MUSCLE \Rightarrow 1. Pronator teres

origin of all 5 muscles Superficial head
 are from Medial epicondyle of Humerus. Humeral head Deep head
 Ulnar head

Median N. Passes b/w two heads.

Ufnal A. Passed deep to the deep head.

Deep head separates Medium N. from Ctrial A.

Flexor carpi Radialis

Causes Flexion & Abduction (at) Coracoid joint.

3. *Palmatis Longus*

Continues in hand as "Palmel Aponeurosis"

Flexor digitorum Superficialis

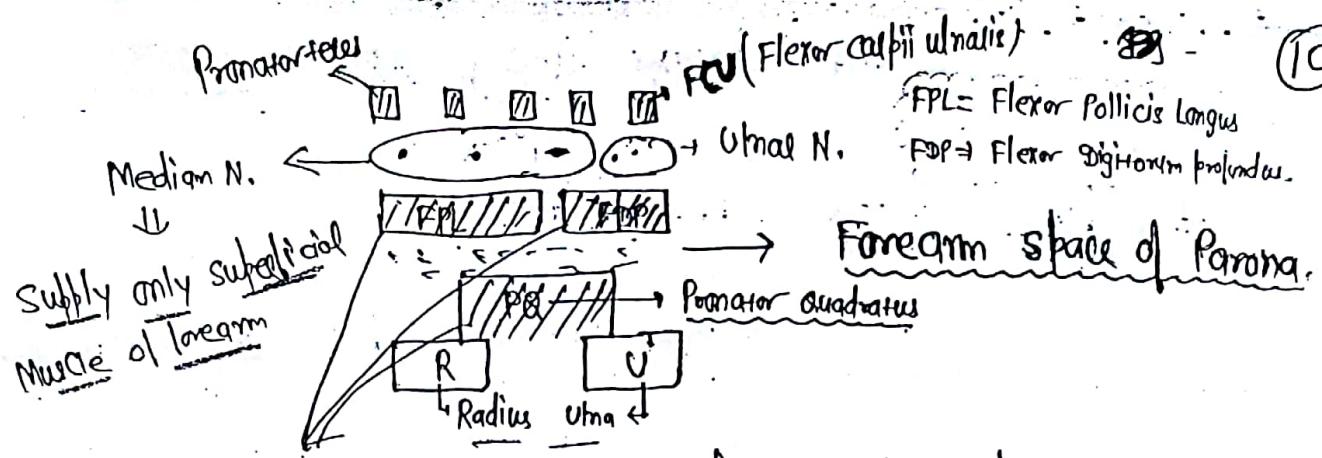
5. Flexor campii Ulnaris

- Cawes Flexion & Adduction (at) wrist joint;

Intermediate Muscle \Rightarrow 1. Flexor Pollicis longus - Ansae from Radius

2. Flexor digitorum profundus - arises from ulna

deep muscle → Pectoralis quadratus



Anterior Interosseous Nerve \Rightarrow Supply Lateral half of Flexor digitorum profundus.

\hookrightarrow Deep branch of Median N.
Given after it passes b/w
2 heads of Pronator teres.

Flexor pollicis longus; Pronator quadratus & Lateral half of Flexor digitorum profundus are supplied by Anterior Interosseous Nerve.

* Carpel-tunnel syndrome \Rightarrow Seen when Median Nerve is compressed.

\downarrow
Carpel-tunnel contains \rightarrow Median Nerve + 9 tendons

$\Delta x \Rightarrow$ Phalen's test; Tinel's sign.

4 FDS + 4 FDP + 1 FPL

* Pronator teres syndrome \Rightarrow Uncommon entrapment of the Median Nerve occurring in the elbow region.

* Ulnar Nerve enters the forearm by passing b/w the two (Humeral & Ulnar) heads of origin of Flexor carpi ulnaris.

* Frament's sign \Rightarrow For Adductor pollicis \Rightarrow Seen in ulnar N. injury.

* Cold Test \Rightarrow For Palmar Interossei (Adductors of fingers) \Rightarrow Seen in ulnar N. injury.

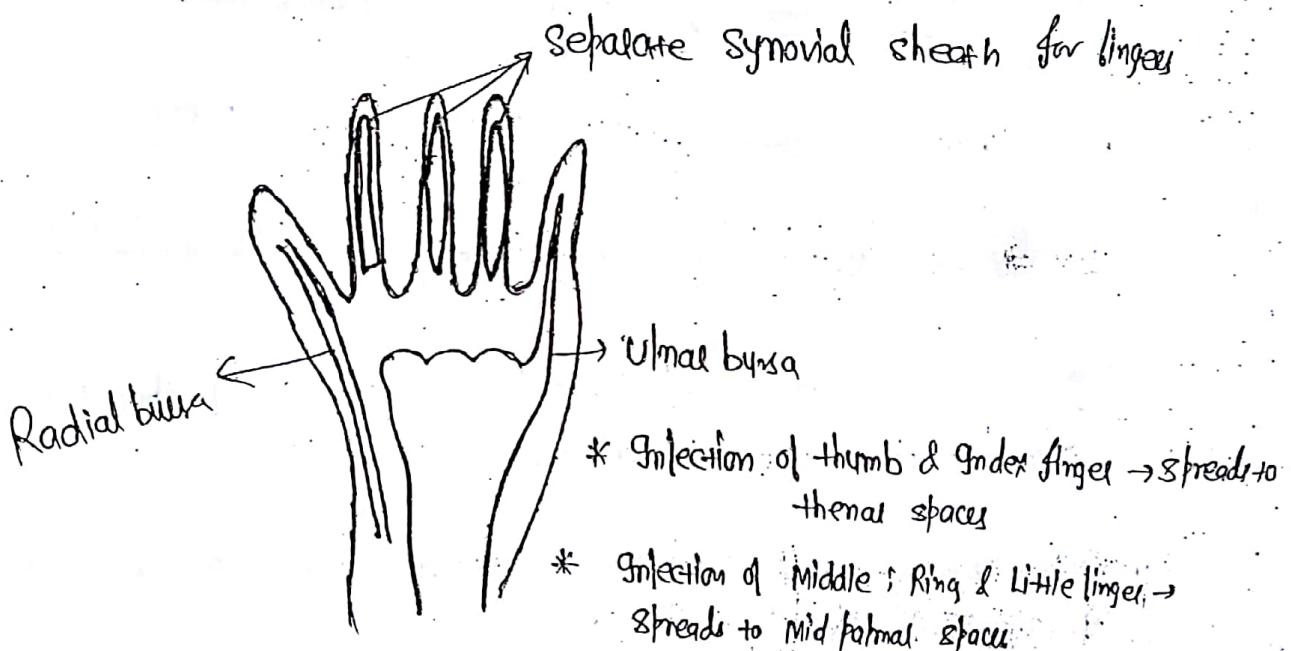
* claw hand is caused by lesion of \Rightarrow Ulnar N. $>$ Median N.

* Guyon's canal syndrome / Handlebar Palsy \Rightarrow caused by entrapment of the Ulnar Nerve in Guyon's canal.

FLEXOR RETINACULUM & CARPAL TUNNEL

- Ulnar bursa encloses the tendon of
 - ↳ Flexor digitorum superficialis & profundus.
 - ↳ Continues in little finger.

- Radial bursa encloses the tendon of
 - ↳ Flexor pollicis longus
 - ↳ Continues in thumb.



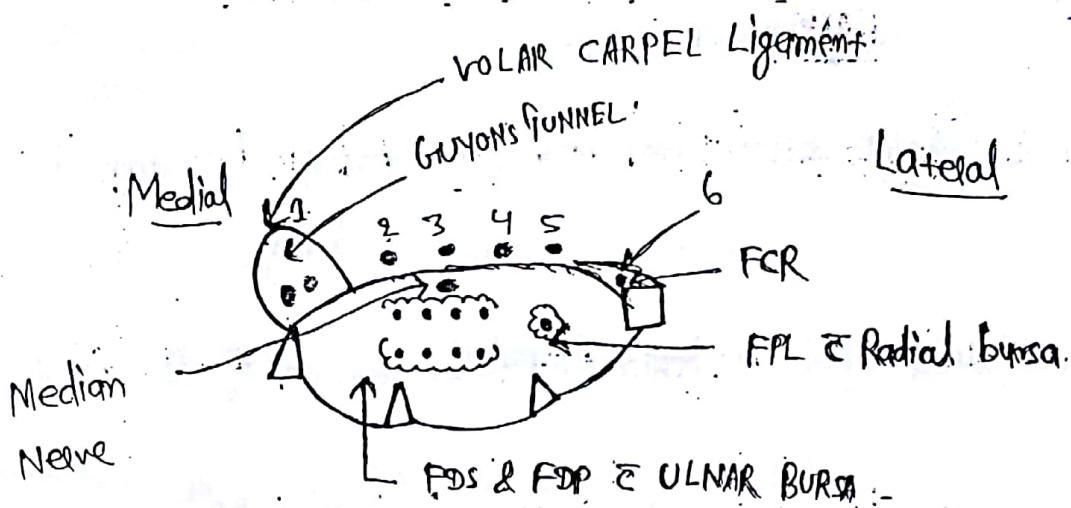
* Structures passing Above Flexor Retinaculum

1. Ulnar Nerve & Vessels

↳ passes below the ulnar carpal ligament through Guyon's canal.

2. Palmer Cutaneous branch of Ulnar Nerve

↳ Supplies the skin over the hypothenar eminence



3. Palmaris Longus

4. Palmar Cutaneous

5. Superficial palmar branch of

6. Flexor carpi Radialis

ULNAR ARTERY \Rightarrow Larger terminal branch of Brachial Artery; arising in cubital fossa.
 enters the palm by passing superficial to Flexor Retinaculum.
Branches \rightarrow (i) In cubital fossa \Rightarrow i) Anterior ulnar recurrent;
 ii) Posterior ulnar recurrent; Anterior interosseous
 iii) Common interosseous \Rightarrow Posterior interosseous.
 (ii) In Forearm \Rightarrow i) Palmer carpal branch
 ii) Dorsal carpal branches
 In Palm \Rightarrow i) Deep branch;
 ii) Superficial branch

* REFLEX & GTS ROOT VALUE

Biceps Reflex \rightarrow C₅, C₆

Tricipital Reflex \rightarrow C₅, C₆

Triceps jerk \rightarrow C₆, C₇

Knee jerk \rightarrow L₂, L₃, L₄

Ankle Reflex \rightarrow S₁

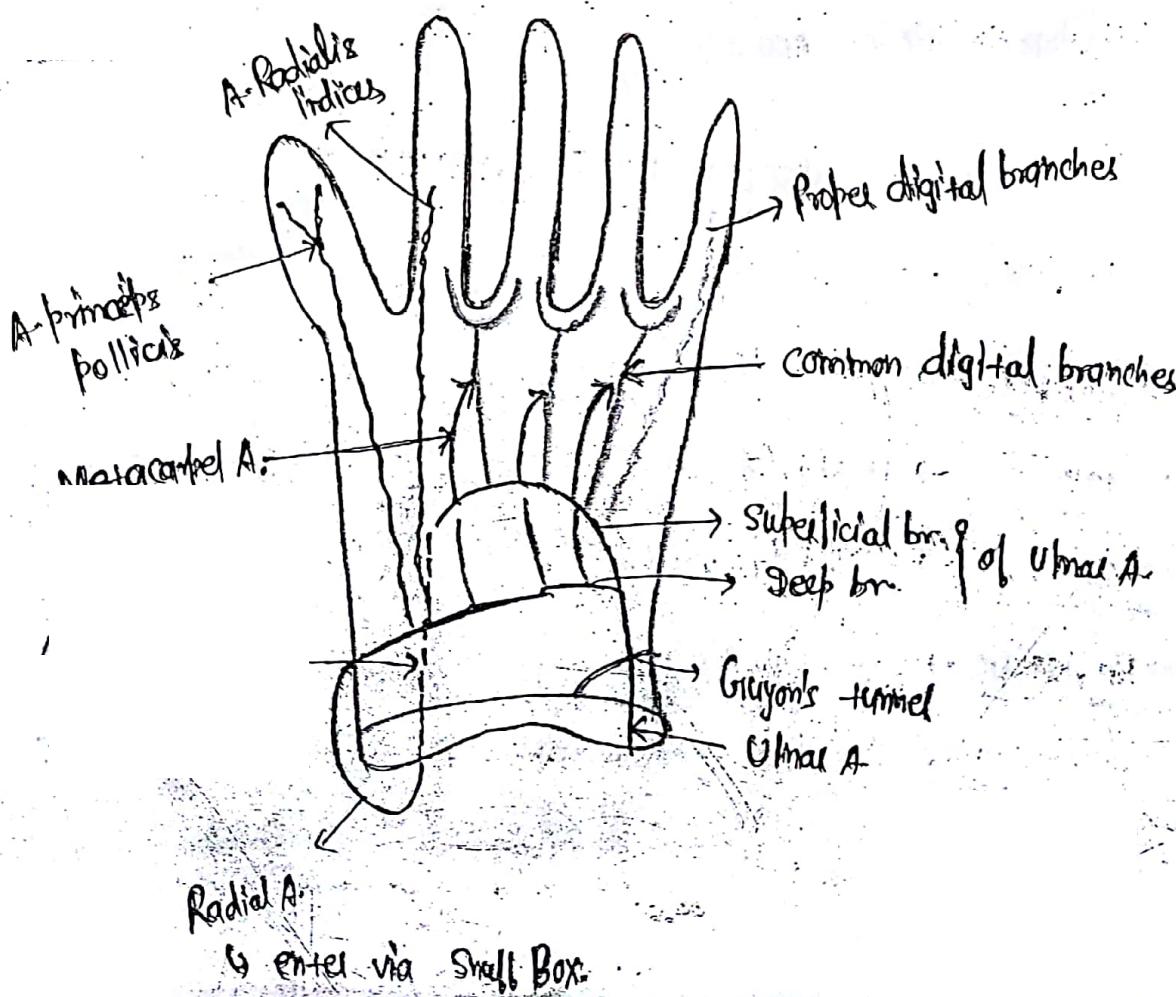
HAND

SUPERFICIAL PALMAR ARCH \Leftrightarrow formed by Superficial branch of Ulnar Artery.

Completed by superficial palmar branch of Radial A.

- Lies above the flexor tendons (FDS; FDP).
- Lies @ the level of distal palmar crease.
- Branches \Rightarrow i> 3 common digital branches
ii> 1 proper digital branches.

Supplies \Rightarrow Medial 3 $\frac{1}{2}$ fingers.



Deep palmar Arch \Rightarrow Formed by Radial A.

(12)

- Completed by deep branch of Ulnar A.
- Lies deep to the tendons of FDS; FDP
- Lies 1 cm proximal to Superficial palmar arch

branches \Rightarrow

- i) Arteria princeps pollicis;
- ii) Arteria Radialis indicis;
- iii) 3 Metacarpal Arteria which anastomoses with 3 common digital branches of superficial palmar arch.

\rightarrow divides into 4 tendons for 4 fingers opposite to the base of proximal phalanx.

The tendon of Flexor digitorum superficialis is inserted on either side of base of middle phalanx of the fingers.
 \rightarrow each tendon divides into 2 slips.

The tendon of Flexor digitorum profundus is inserted on base of distal phalanx of the fingers.

\hookrightarrow Causes flexion of DIP joint;

LUMBRICALS \Rightarrow Flex the Metacarpophalangeal joint & extends interphalangeal joints.

Inselfed on \rightarrow the lateral aspect of the base of proximal phalanx of the fingers.

\rightarrow Dorsal aspect of the base of distal phalanx of fingers.

N. Supply \Rightarrow

1st & 2nd Lumbricals \Rightarrow Median N.

3rd & 4th Lumbricals \Rightarrow Ulnar N. (Deep branch)

Action \Rightarrow Flexion @ MP joint

Extension @ IP joint

* Paralysis leads to claw hand,

* Muscles supplied by Median N. In the Hand \Rightarrow 5 Muscles

Abductor pollicis brevis

Flexor pollicis brevis (Superficial head)

Opponens pollicis

1st & 2nd Lumbriicals.

Grip of the hand is due to Flexor tendons (Long)

* Muscles supplied by Ulnar N. In the Hand \Rightarrow 15 Muscles

Abductor digiti minimi brevis

Flexor digiti minimi brevis

Opponens digiti minimi

3rd & 4th Lumbriicals

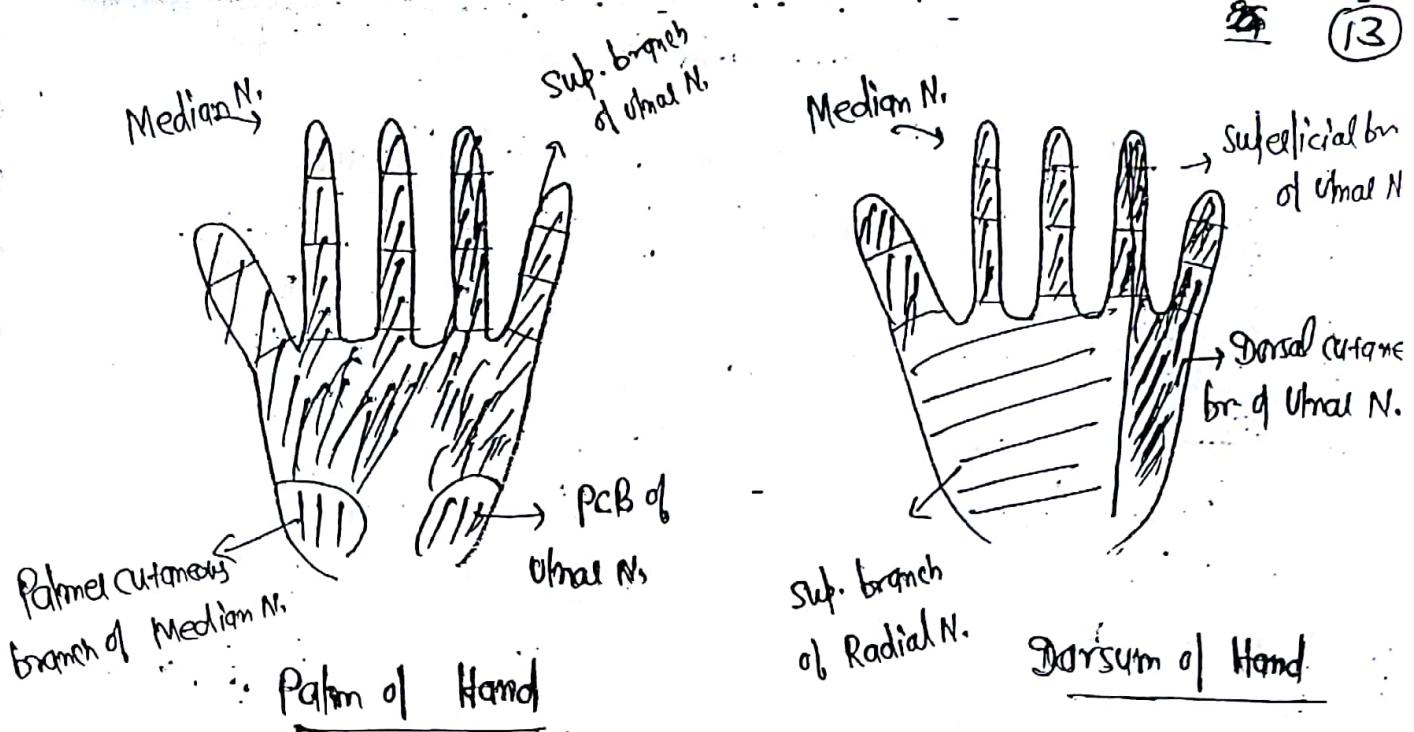
4 Palmer Interossei (Adduction of fingers)

4 dorsal Interossei (Abduction of fingers)

Adductor pollicis (Graveyard of Ulnar N.)

Deep head of Flexor pollicis brevis

* Superficial branch of Ulnar N. supplies \Rightarrow Palmaris brevis



Eye of the Hand is which Nerve \Rightarrow Median N.

Eye finger of Hand \Rightarrow Index finger
(Max^m proprioceptor \Rightarrow ②)

 Klaus "Labourer's Nerve"

Ulnar Nerve \Rightarrow Musculocutaneous Nerve

- The Superficial & deep branches of Ulnar N. is given in hand.
- The Palmar cutaneous branch & dorsal cutaneous branch are given in the forearm / @ the wrist / before the flexor retinaculum.

* Wartenberg's sign \Rightarrow Inability to adduct the small finger in again the ring finger due to weakness of Palmar Interossei much

* All Metacarpals (except 1st) have \Rightarrow Distal (Head epiphysis)

* 1st Metacarpal & all phalanges have \Rightarrow Proximal (Base epiphysis).



RADIAL NERVE (Saturday Night Palsy)

- Branch of Posterior cord of Brachial plexus.
- brt. on Posterior aspect of 3rd part of Axillary A.

Branches i>
& Supply

2 Muscular

Long head
of Triceps

Medial head
of Triceps

In Axilla

1 Cutaneous



Posterior cutaneous Nerve of
Arm.

ii>

In spiral groove

3 Muscular

Lateral head of Triceps

Medial head of Triceps

Anconeus (Detached part of Medial
head of Triceps)

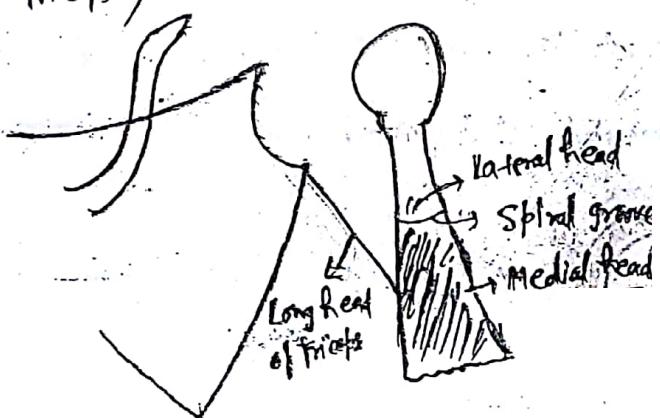
help in straightening

Movement: helps
triceps to extend
elbow joint.

2 Cutaneous

Posterior cutaneous Nerve of forearm

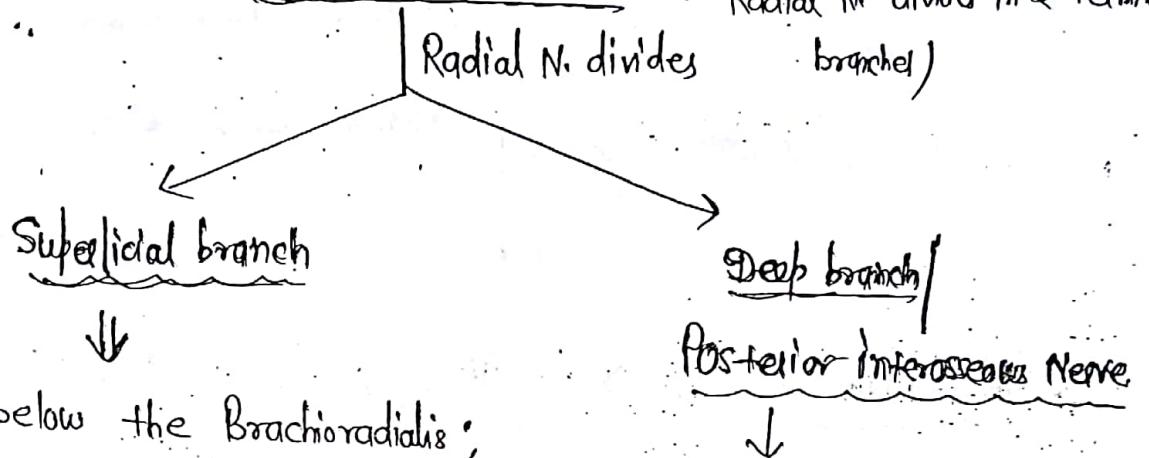
Lower lateral cutaneous Nerve of Arm



iii) Lateral aspect of the Arm

- Brachialis (Lateral trall)
- Brachioradialis
- ECRL (Extensor carpi Radialis Longus)

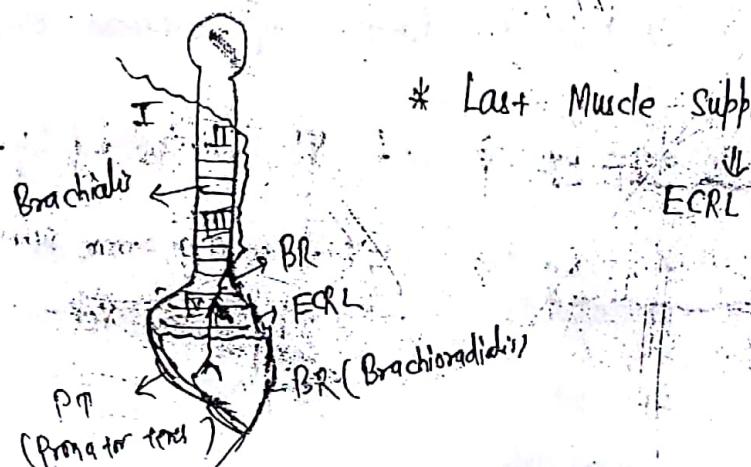
iv) In the cubital fossa (Ant to Lateral epicondyle; the Radial N. divides in 2 terminal branches)



Goes below the Brachioradialis;
Lies in the roof of Anatomical
Snell box & supplies the skin
on the dorsum of hand & proximal
phalanges of Lateral 3½ fingers.

Pierces the Sublimis & suppl
all the dorsal aspect

Cherigia Paresthetica \Rightarrow Compression of the superficial br. of Radial Nerv @ wrist.



BACK OF THE FOREARM

SUPERFICIAL MUSCLE \Rightarrow

Anconeus - Radial N. in spiral groove
Innervation: ^{DNB 16} Inserted on base of 5th metacarpal bone

Radial N. on the Lateral aspect of Arm
Muscle of extension compartment of forearm that causes flexion of elbow.

Posterior Interosseous Nerve

Brachioradialis
Extensor carpi Radialis Longus

Extensor carpi Radialis brevis
Extensor digitorum
Extensor digiti minimi

Extensor carpi ulnaris

Deep Muscle

\Rightarrow Abductor Pollicis Longus

form
Anatomical Snuff
box

Extensor pollicis brevis
Extensor pollicis Longus
Extensor indicis
Supinator

Wrist drop \Rightarrow d/t Paralysis of ECRL.

Finger drop \Rightarrow d/t Paralysis of Extensor digitorum.

Extension of wrist done by \Rightarrow ECRL supplied by Radial NC

Extension of digit done by \Rightarrow Extensor digitorum supplied by Posterior Interosseous Nerve

Lesion of Radial Nerve

High Lesion

- In axilla
- In spiral groove

Wrist drop &
Angel drop

Low Lesion

Type-I

- b/w spiral groove
& Lateral aspect of

Arm

Wrist drop &
finger drop

Type-II

- In Cubital fossa



Gof finger drop clou.
wrist drop

ANATOMICAL SNUFF BOX

Boundaries

→ Lateral / Anterior → Abductor Pollicis Longus

Extensor Pollicis Brevis

Medial / Posterior → Extensor pollicis Longus

Floor →

Styloid process of Radius

Scapoid

Trapezium

→ Floor is carpeted by tendons of ECRL & ECRB.

Content →

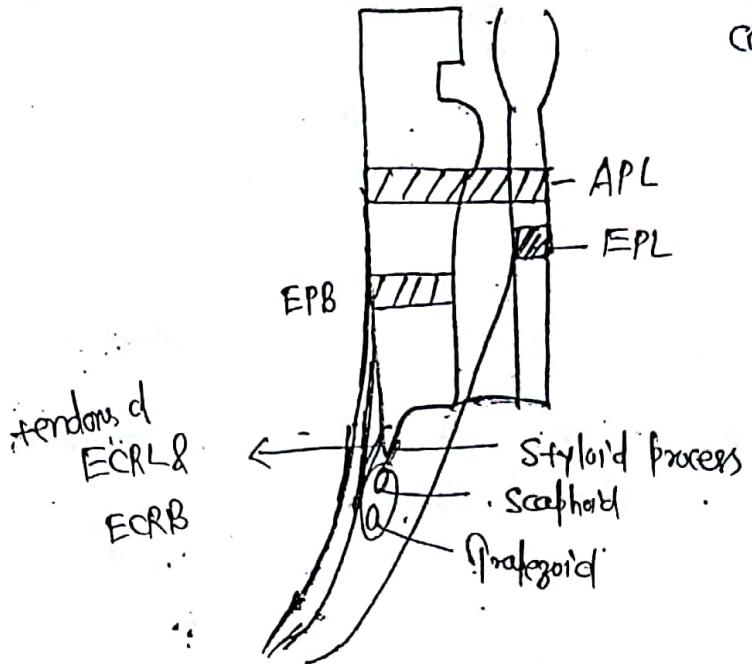
Radial A. (only one content)

Root →

Cephalic vein

Sup. branch of Radial n.

* Finger by which all the Nerves
can test \Rightarrow Thumb



EXTENSOR RETINACULUM

Material to Medial compartment \hookrightarrow

Ist compartment \Rightarrow Abductor pollicis Longus

Extensor pollicis brevis

IInd compartment \Rightarrow ECRL

ECRB

IIIrd compartment \Rightarrow Extensor Pollicis Longus

Extensor digitorum

Anterior Interosseous A

Extensor Indicis

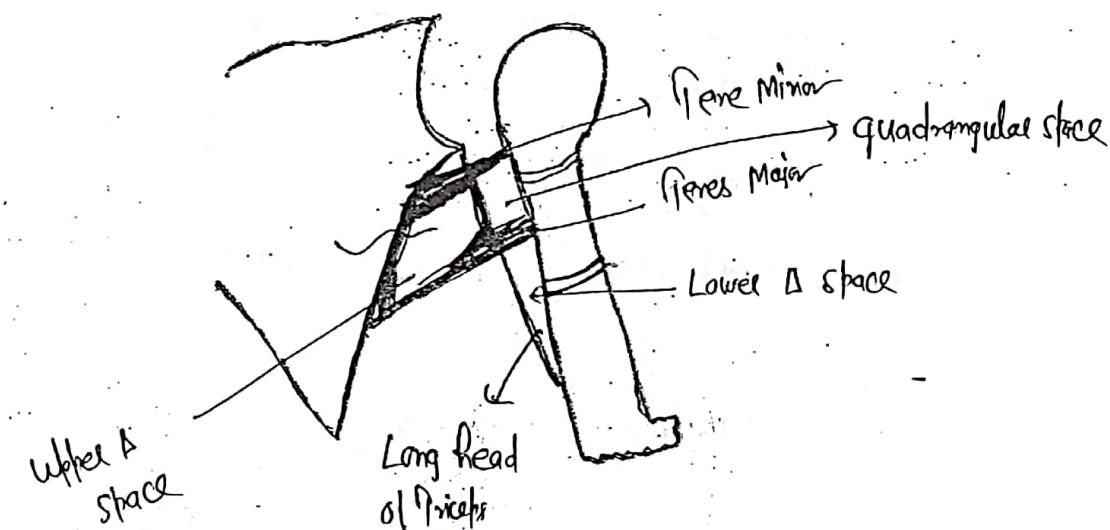
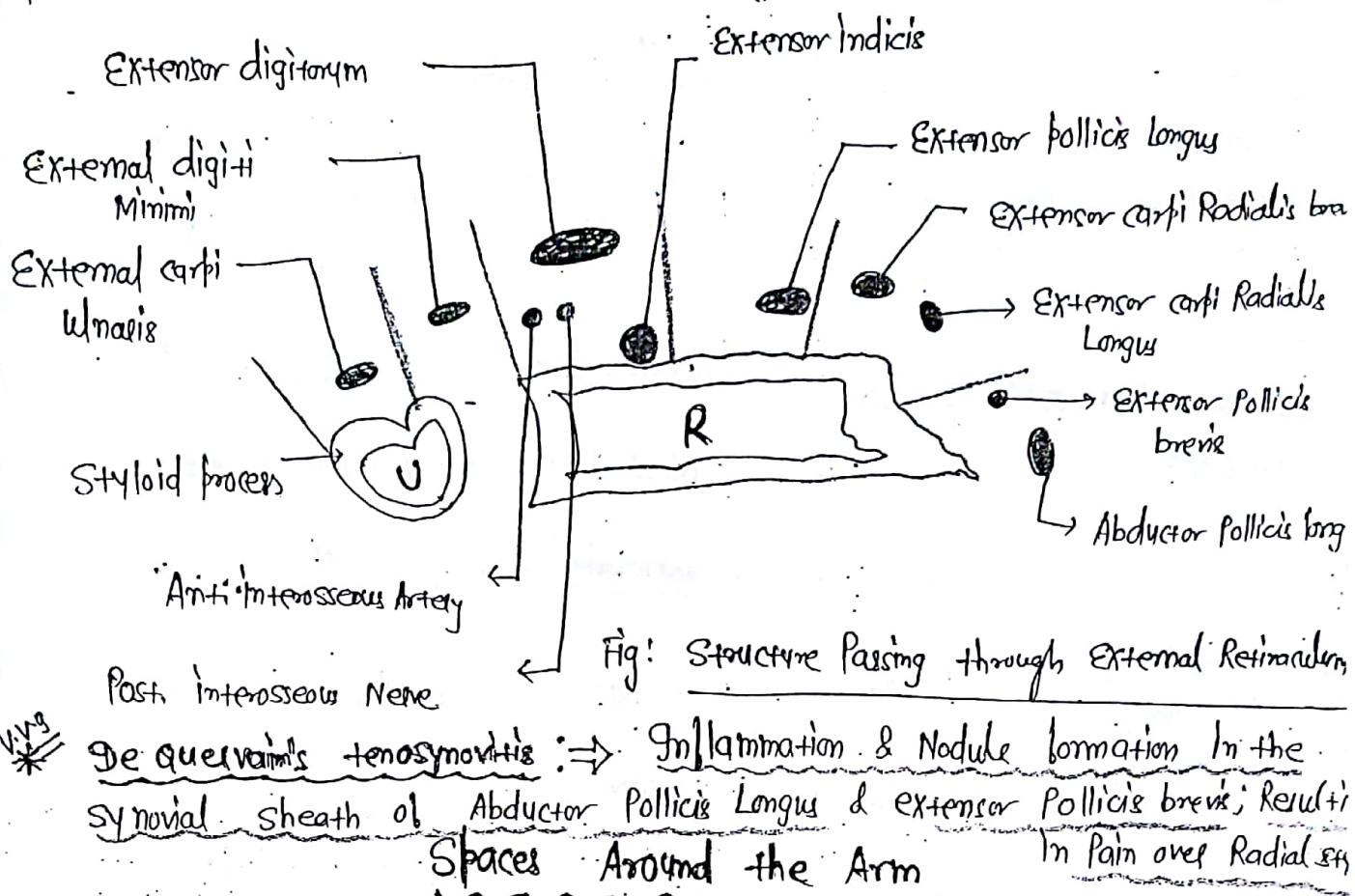
Posterior Interosseous N.

Extensor digiti minimi

IVth compartment \Rightarrow

Extensor carpi ulnaris

Vth compartment \Rightarrow



Upper Δ space ⇒ Content ⇒ Circumflex humeral A

Lower Δ space ⇒ Content ⇒ Radial N.

Pronunda brachii A.

Axillary N.

Posterior circumflex humeral vessels.

Quadrangular space ⇒ Content ⇒

Region

- Upper Triangular Space of Arm



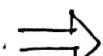
Boundaries

Superior : Teres Minor

Inferior : Teres Major

Lateral : Long heads of Triceps

- Lower Triangular Space of Arm



Superior : Teres Major

Medial : Long head of Triceps

Lateral : Shaft of Humerus

- Quadrangular Space of Arm



Superior : Teres Minor

Inferior : Teres Major

Medial : Long head of Triceps

Lateral : Surgical Neck of Humerus

*

DERMATOME ↳

THUMB

- C₆

3 fingers

- C₇

Little finger

- C₈

1st web space

- C₆-C₇

Last web space

- C₇-C₈

Chief Lymph Node draining the breast \Rightarrow Anti-Axillary (17)

Chief Artery Supplying the breast \Rightarrow Lateral thoracic Artery.

Involvement of Cutaneous Lymphatics \Rightarrow In Ca breast leads to Peau-de-orange appearance

Involvement of Lactiferous duct \Rightarrow In Ca breast leads to Retraction of Nipple

Involvement of Cooper's Ligament in Ca breast leads to Puckering/drawing of skin over breast.

Triangle of Auscultation

Medial \Rightarrow Trapezius

Lateral \Rightarrow Medial border of scapula

Base \Rightarrow Latissimus dorsi

Floor \Rightarrow 6th & 7th Rib in Intercostal space b/w them
&
Rhomboides Major

* Wrist joint is formed b/w Lower end of Radius & 1st 3 carpal bones (Scaphoid; Lunate & Triquetrum) - Separated by Articular disc

JOINTS OF UPPER LIMB

Sterno clavicular joint \Rightarrow Saddle type of synovial joint.

Axomio clavicular joint \Rightarrow Plain synovial joint
↳ only gliding movement

Shoulder Joint \Rightarrow Ball & Socket joint

elbow joint \Rightarrow Hinge joint

Superior & inferior Radio-ulnar joint \Rightarrow Pivot joint (synovial)
(Trochoid)

Middle Radio-ulnar joint \Rightarrow Syndesmosis type of fibrous joint

wrist joint \Rightarrow Ellipsoidal type of joint.

1st carpo Metacarpel Joint \Rightarrow Saddle type of synovial joint,
(stellate)

Intercarpal joint \Rightarrow Plain synovial joint

Metacarpophalangeal joint \Rightarrow Condyloid type of synovial joint (ellipsoidal
More than
condyles).

Interphalangeal joint \Rightarrow Hinge joint

* Unipinnate Muscle \Rightarrow Arises from 1 tendon (Eg \Rightarrow 1st & 2nd Lumbricals)
or from 1 bone (Eg \Rightarrow Palmar Interossei)

↳ Bifinnate Muscle \Rightarrow Arises from 2 tendon (Eg \Rightarrow 3rd & 4th Lumbricals)
or from 2 bones (Eg \Rightarrow Dorsal Interossei)

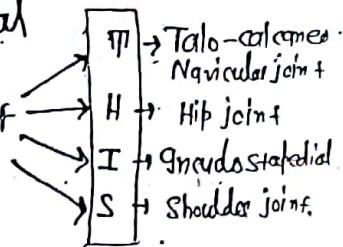
* Most frequently dislocated joint \Rightarrow Glenohumeral (most mobile joint),

ANATOMY

JOINTS OF FOOT

18

- * Sub-talar joint (Talocalcaneum) → Plain Synovial
- * Talo calcaneonavicular Joint → Ball & Socket
- * Calcancuboid joint → Saddle
- * Smaller joint of forefoot → Plain synovial
- * Meta-tarsophalangeal joint → Condylar joint
- * Interphalangeal joint → Hinge joint



ARCHES OF FOOT

Medial Longitudinal Arch

Bones → calcaneum; Talus
Navicular; 3 (meiform)
3 Metatarsal bones

Intersegmental → Sling Ligament / Plantar calcaneo-Navicular Ligament

Supports the head of Talus

Sling → Tibialis Anterior &
Tibialis Posterior

Lateral Longitudinal Arch

calcaneum; cuboid;
4th & 5th Metatarsal

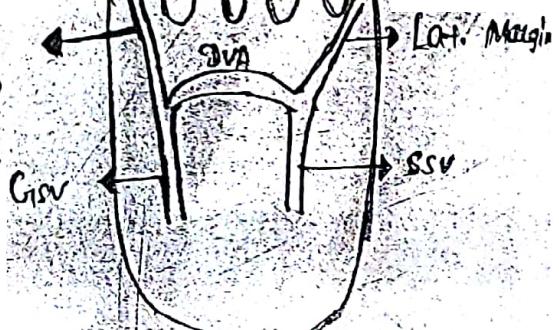
Short & long plantar ligaments

Pronator Longus &
Pronator brevis

VENOUS DRAINAGE OF LOWER LIMB

- ① Dorsal venous Arch
- ② Medial Marginal vein
- ③ Lateral Marginal vein
- ④ GSV (Great saphenous vein)
- ⑤ SSV (Short saphenous vein)

Medial
Marginal vein



Great Saphenous vein (GSV)

- Goes in front of Medial Malleolus
↳ 1cm Anterior to Medial Malleolus (NEET'16)

- Accompanies the saphenous N.

- Drains into femoral vein

Saphenous opening lies 4cm (1.5 inch) below & lateral to Pubic tubercle where it opens into femoral vein.

Perforating veins (They connect the superficial veins & the deep veins)

Location

Mid-thigh
(Odds)
Humeralion

Adductor
canal

Knee
Perforator
(Boyle)

Just below
Knee

Leg -
Lateral Ankle

Junction of
Middle & Lower third

Leg -
Medial Ankle
(Cockett)

Upper Medial -
Junction of Middle &
lower third of Leg

Lower Medial -

below & behind Medial
Malleolus

Middle - b/w two

Short saphenous vein (SSV)

- Goes behind the Lateral Malleolus

- Accompanied by the Sural N.

- Drains into Popliteal/Posterior tibial vein

Connects

Great saphenous vein
with the femoral vein

Great saphenous with the
Posterior tibial V.

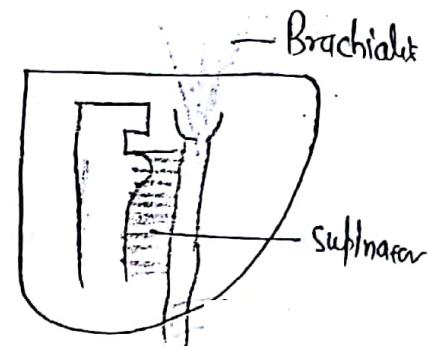
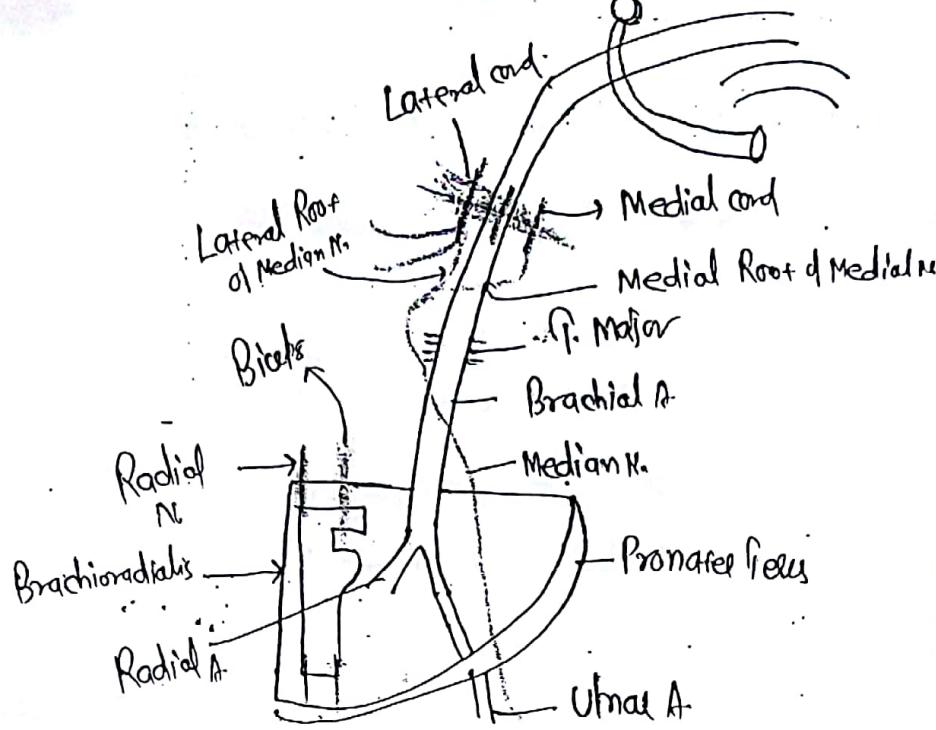
Short saphenous with the
Peroneal vein

Posterior Arch vein
& the Posterior tibial
vein

CUBITAL FOSA

~~19~~

(19)



~~AT IS~~ \rightarrow Structure over bicipital Aponeurosis in cubital fossa \rightarrow Veins. Floor
 Bicipital Aponeurosis lies over Brachial Artery & Median Nerve in cubital fossa.

- * Tennis Elbow \Rightarrow Type of Repetitive Strain Injury Resulting from tendon overuse & failed healing of tendon.
- "Extensor carpi Radialis brevis" - Muscles play a key role.
- "Klaus" Lateral epicondylitis" (NEET 2016)

Boundaries of cubital fossa \Rightarrow Superior \rightarrow Inter-epicondylar line of humerus
 Medial \rightarrow Pronator teres;
 Lateral \rightarrow Brachioradialis;
 Floor \rightarrow Brachioradialis & supinator
 Roof \rightarrow Skin; Superficial fascia; Median cubital vein; Bicipital Aponeurose.

Content of cubital fossa (Medial to Lateral) \Rightarrow Median Nerve (Medial Most);
 Brachial Artery (Bifurcation of brachial A ∞ initial part of Radial & Ulnar arteries)
 Tendons of biceps brachii & Ulnar artery
 Radial Nerve
 Some Lymph Nodes

GENERAL EMBRYOLOGY

- Fertilisation occurs in \Rightarrow Ampulla of Fallopian tube
- Zygote divides to form \Rightarrow 16 celled Morula



as it enters in Uterine cavity; fluid from the uterus enters the Morula & divides it into \rightarrow Outer cell Mass / Trophoblast

Germ cell Mass / Embryoblast

- Cavity is k/a "Blastocyst"
- This structure is k/a "Blastula"

- The Outer cell mass / differentiate into Trophoblast

Syngnathoblast

cell walls are abt. & the Nuclei are scaffolded

Cytotrophoblast

cell walls are distinct ;
there is one Nucleus in each cell

- The Germ cell Mass / differentiate into Embryoblast

Ectoblast

Polar & ectodermal cells

Hypoblast

cuboidal cells

- Epiblast grows around the Cytotrophoblast to enclose + Amniotic cavity.

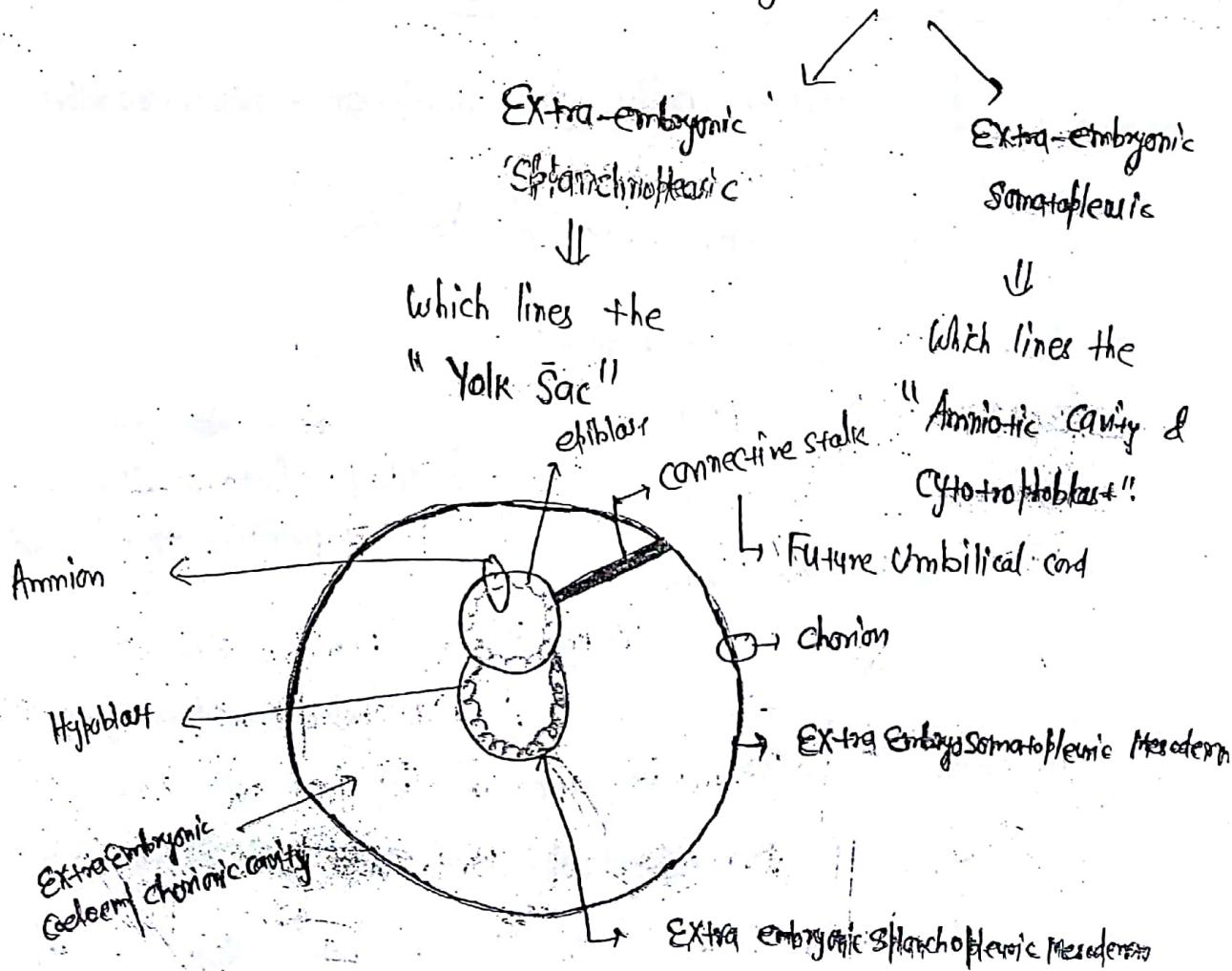
- Hypoblast similarly encloses the Yolk Sac.

- The germ disc is \Rightarrow Bilaminar.

- The Hypoblast / Yolk Sac forms "Extra-embryonic Mesoderm"

↓
which lies b/w Amniotic cavity, Yolk Sac & Cytotrophoblast.

- Small cavities appear here ; which joins to form extra-embryonic coelom / chondric cavity; this cavity divides the Mesoderm in



I Formation of Pro-chordal plate / Bucco-pharyngeal Membrane

- The Hypoblast @ one end become columnar.



they form an elevation in the Amniotic cavity



K/Las "Prochordal plate"



forms future Mouth

→ determines cephalic end & caudal axis
of embryo

II Formation of Primitive streak

- The epiblastic cells @ caudal end grows rapidly



they form an elevation in the Amniotic cavity



* cell responsible for formation of 3 germ layers
in an embryo is ⇒ Epiblast;

K/Las "Primitive streak"



* 1st germ layer to be formed in embryo. Rounded anterior structure is K/Las

"Primitive knot / node"



Depression in Primitive Knot is K/Las

"Blastopore / Primitive pit."

Functions



Formation of all the germ layers



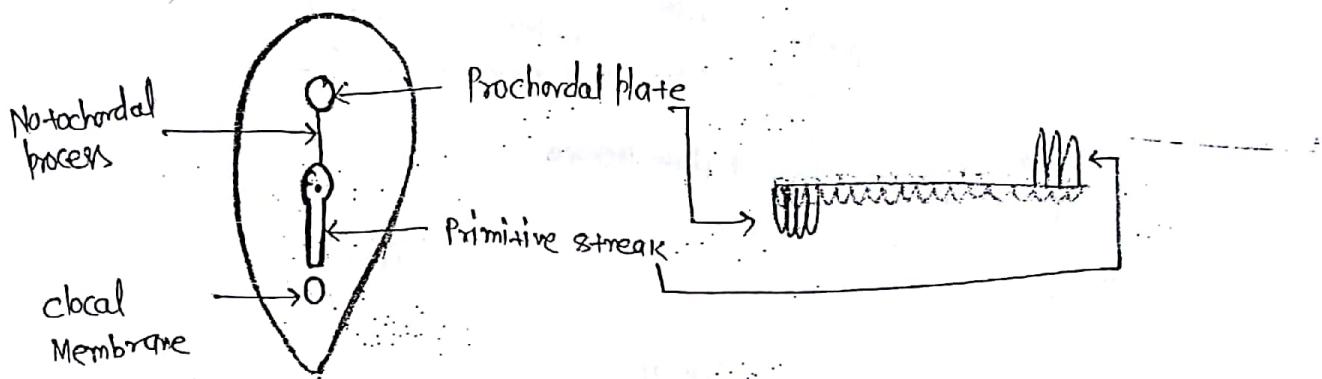
Formation of Notochordal process

Fate ⇒

it disappears, but if persists form "Gastro-angio-endothelial fold"

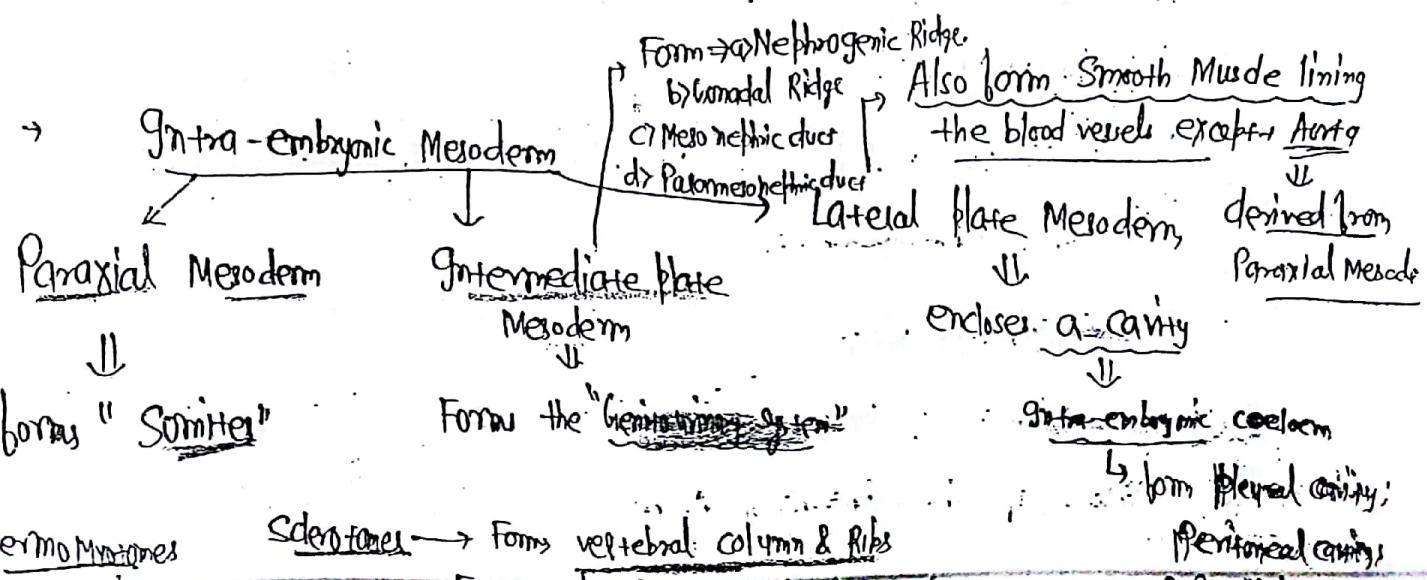
III Formation of Notochord: \Rightarrow

- derived from Notochordal process (derived from primitive streak)
- The blastopore inside this process to form a Notochordal canal.
- Lies in Mesoderm.
- Extends from primitive knot to prochordal plate.
- It disappears except \Rightarrow Nucleus pulposus of intervertebral discs
Apical Ligament of spine



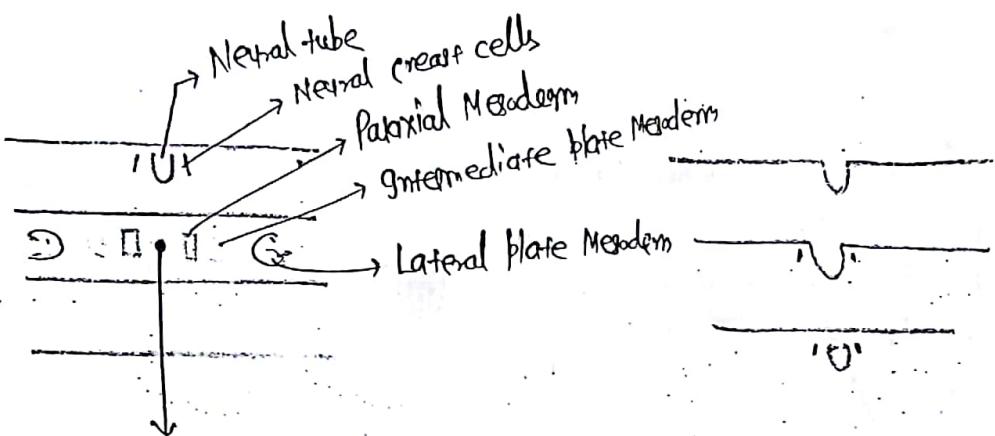
\rightarrow IV Intra-embryonic Mesoderm \Rightarrow It migrates b/w Ectoderm & Endoderm at all the sites except \rightarrow Prochordal plate \rightarrow Cloacal Membrane

At this two ends the ectoderm & endoderm are fused



Formation of Neural tube \Rightarrow Derive from ectoderm.

- ↳ Forms the Brain & spinal cord;
- ↳ Ant. Neuropore $\underset{\downarrow}{\text{Closes by 25-th day of IUL}}$ (cranial)
Fail to close \Rightarrow Anencephaly
- Post. Neuropore $\underset{\downarrow}{\text{Closes by 27-th day of IUL}}$ (caudal)
Fail to close \Rightarrow Spinal bifida.



* closure of Neural tube begins in the cervical Region; then extends cranially & caudally.

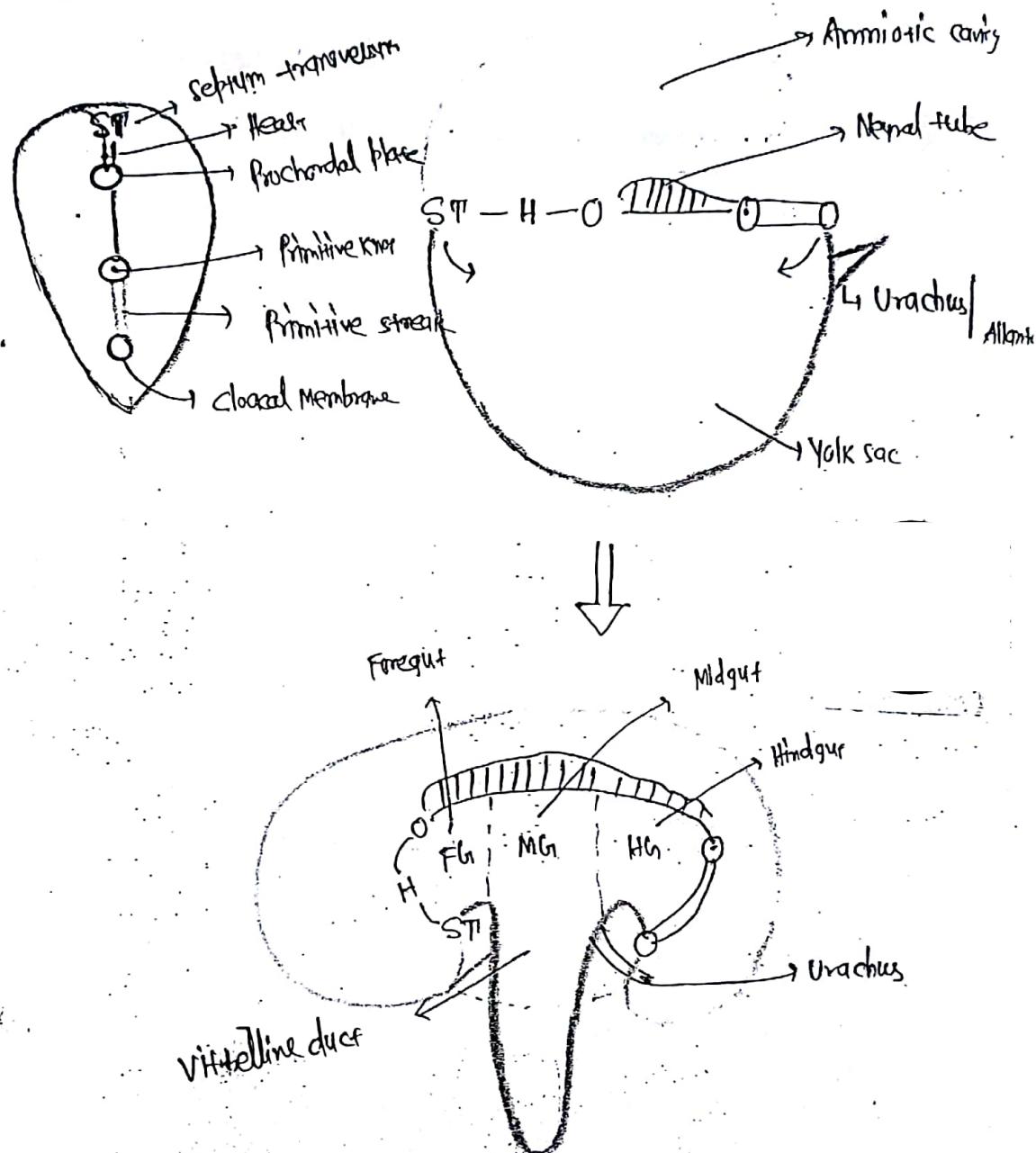
* Derivative of Neural crest cells \Rightarrow

- ① Adrenal Medulla & NEFIL
- ② Lepto meninges (Pia mater + Arachnoid)
- ③ odontoblast (teeth forming cells)
- ④ Melanocytes
- ⑤ Schwann cells (form Myelone in Peripheral Nervous system)
- ⑥ Dorsal Root ganglion
- ⑦ Autonomic ganglion
- ⑧ Skeleton of Face
- ⑨ Neves of the Pharyngeal Arches

(10) Endocardial cushion of the heart;

(11) Aortico-pulmonary septum;

(12) Para-follicular "C" cells of Thyroid.



1^o Villus \Rightarrow Syncytiotrophoblast & Cytotrophoblast

2^o Villus \Rightarrow Syncytiotrophoblast + Cytotrophoblast + Extra-Embryo Mesod.

3^o Villus \Rightarrow Syncytiotrophoblast + Cytotrophoblast + Extra-Embryonic M + B vessels.

* Feto-placental barrier

- ① Endothelial cells of maternal B. vessels,
- ② Syngio-trophoblast;
- ③ Cyto-trophoblast;
- ④ Extra-embryonic Somatopleuric Mesoderm;
- ⑤ Endothelium of fetal blood vessels.



INFERIOR EXTREMITY

- Pelvifemoral space \Rightarrow Lies below the Inguinal Ligament;
 - Similar to apex of axilla,

Meralgia Paresthetica \Rightarrow Compression of Lateral femoral cutaneous N. of thigh (Branch of Lumbal plexus), against the Inguinal Ligament.

- Femoral triangle \Rightarrow Boundaries \Rightarrow

Laterally \Rightarrow Medial border of sartorius

Medially \Rightarrow Medial border of Adductor Longus

Base \Rightarrow Inguinal Ligament

Floor \Rightarrow Gliacus;

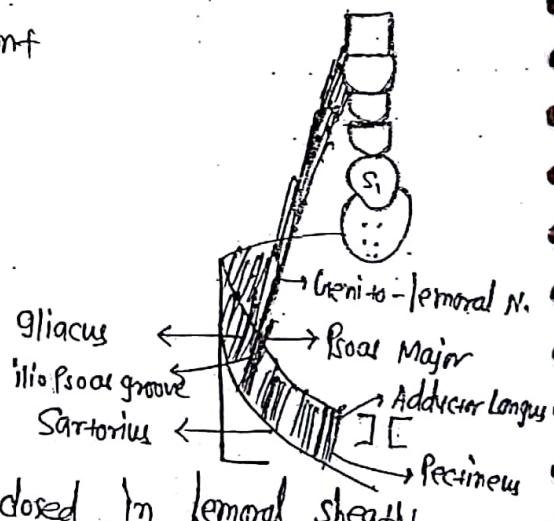
(Lateral to Medial) Psoas Major

Pectenew

Adductor Longus

Contents \Rightarrow Femoral vessels enclosed in femoral sheath;

Femoral Nerve.



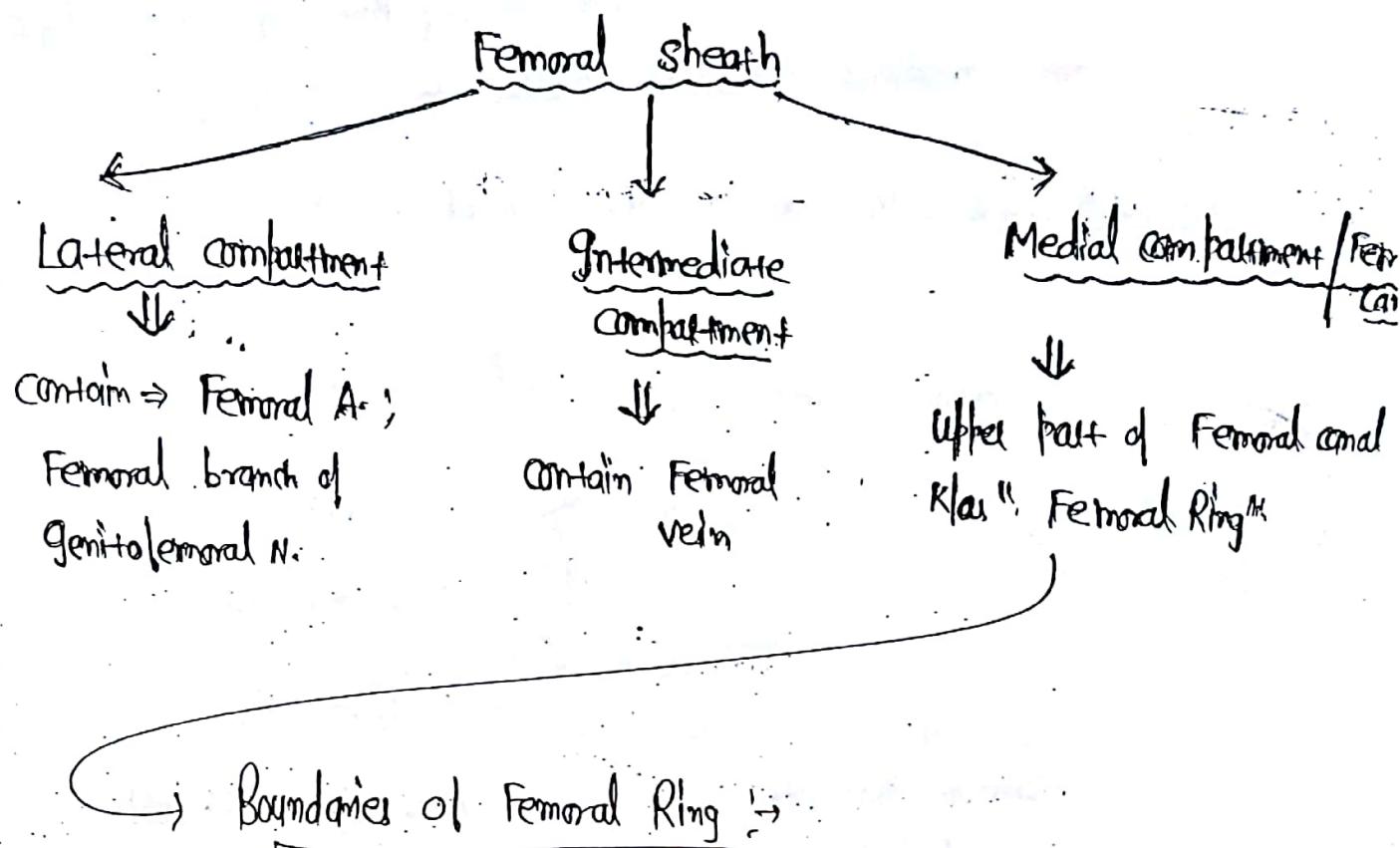
* Femoral Hernia \Rightarrow Below & lateral to Pubercle (pubic)

Inguinal Hernia \Rightarrow Above & medial to Pubic tubercle

Femoral sheath \rightarrow funnel shaped fascial sheath enclosing up to 3-75cm of femoral vessels.

Anterior \Rightarrow Fascia transversalis

Posterior \Rightarrow Fascia iliaca



Anterior \Rightarrow Inguinal Ligament / Poupart's Ligament

Medially \Rightarrow Lacunar Ligament / Gruber's Ligament

Posteriorly \Rightarrow Pectenate Ligament / Cooper's Ligament

Laterally \Rightarrow Septum separating it from femoral vein

* Femoral Ring is closed by "Lymph Node of Cloquet / Rosenmüller"

drain by glans penis or glans clitoris.

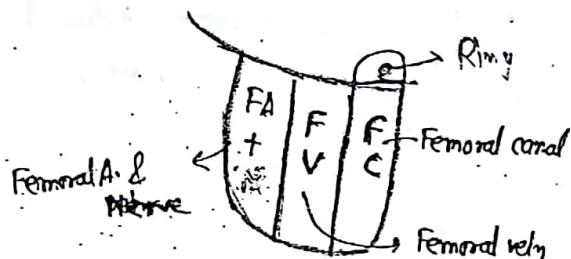
* Femoral Ring is wider in females due to wider pelvis & smaller size of blood vessels.



Occasionally Abnormal obturator artery (Branch of Inferior epigastric) lies on Lacunar Ligament, leading to hemorrhage

CEP 116

Femoral Nerve lies outside the Femoral sheath



Anterior Superior iliac spine
(ASIS)

Anterior iliac spine (AIES)

Muscle

Sartorius

Straight head of Rectus
femoris.

Ligament -

Inguinal

Ilio-femoral Ligament

Anterior compartment of thigh

SARTORIUS \Rightarrow Origin \Rightarrow Ant. Superior Iliac Spine

Longest Muscle of the body. Insertion \Rightarrow Medial aspect of shaft of tibia along with ~~Gastrocnemius & Semitendinosus~~

Gray Ropes (Pes Anserinus)

Action \Rightarrow Abduction; Lateral Rotation & Flexion @ Hip joint

Flexion & Medial Rotation @ Knee joint

— Also known "Tailor's Muscle or Honeymoon Muscle!"

Quadriceps femoris \Rightarrow Rectus Femoris + Vastus Medialis + Vastus Intermedius + Vastus Lateralis.

Rectus Femoris \Rightarrow

Straight head



Arises from

Ant. Inferior Iliac Spine

Reflected head



Arises above
the Acetabulum

Action \Rightarrow Extension @ Knee joint &

Flexion @ Hip joint.

Vastus Medialis

Vastus Intermedius

Vastus Lateralis

Insertion of Quadriceps femoris \Rightarrow base of the patella

continues as Ligamentum patellae

Action \Rightarrow

Extension @ the knee joint; Rectus femoris
also causes flexion @ the hip joint.

Locking of the knee joint (Medial rotation of
Femur during the final stages of extension,
When the foot is on the ground)

When foot is off the ground \rightarrow Tibia rotates laterally

Femoral Nerve

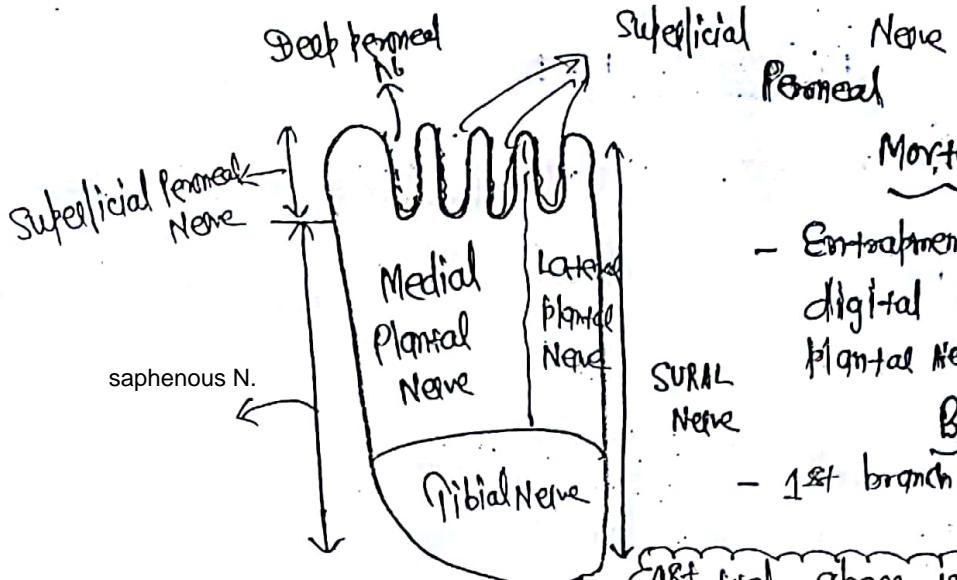
- Largest branch of Lumbar plexus;
- formed by the dorsal division of Ventral Rami of L₂, L₃.
- Lies in the Ilio-Psoas groove.
- Lies outside the femoral sheath,
- It has a trunk; Anterior & Posterior division.
- Branches from Trunk \Rightarrow N. to Gliacu;
N. to Pectenius; (Lateral hall)

~~CEP July 16~~

N. to Pectenius passes Medialward behind the Femoral Artery.

- Branches from Ant. division \Rightarrow
 - 1 Muscular
 \Downarrow
Sartorius
 - 2 Cutaneous
 \Downarrow
Medial & Ant. / Intermediate femoral cut Nerve of thigh
- Branches from Post. division \Rightarrow
 - 4 Muscular
 \Downarrow
Quadriceps femoris
 - 1 Cutaneous
 \Downarrow
Saphenous Nerve (Longest Cutaneous N.)

→ Supplies the skin on Medial surface of Leg & foot up to Great toe.



Mortons Neuroma

- Entrapment of 3rd common digital Nerve (Br. of Median Plantar Nerve).

Baxter's Nerve

- 1st branch of Lateral Plantar Nerve.

1st Web Space is supplied by

Deep peroneal N.

Rest all other web space is supplied by

Superficial Peroneal N.

Femoral Artery

- continuation of external iliac; below Inguinal Ligament.
- continues as popliteal artery; after bleeding Adductor Magnus  Hiatus Magnus.
- Branches in the femoral A 

Superficial

Deep

Superficial epigastric A.

Superficial circumflex iliac A

Superficial external pudendal A

Supplied external genitalia

Deep external pudendal

Muscular branches

Profunda femoris

Medial circumflex femoral A

Lateral circumflex femoral A

Retinacular branches; which

Perforating branches

Pierces Adductor brevis &

Total No. of Perforators \Rightarrow 4

↳ 2nd Perforating branches gives Nutrient A. to Lenus OA.

- Branches In Adductor Canal \Rightarrow

Descending Genicular Artery

↳ Last branch given by the Femoral before it pierces the adductor Magnus

Extra edges

* Coronary Ligament \Rightarrow Attaches the Medial & Lateral Meniscus to the Medial & Lateral condyle of tibia.

* Menisco-femoral Ligament \Rightarrow attaches the posterior part of Lateral Meniscus to the Femur.

(a) Anterior Menisco-Femoral Ligament | Ligament of Humphrey \Rightarrow
goes Anterior to PCL.

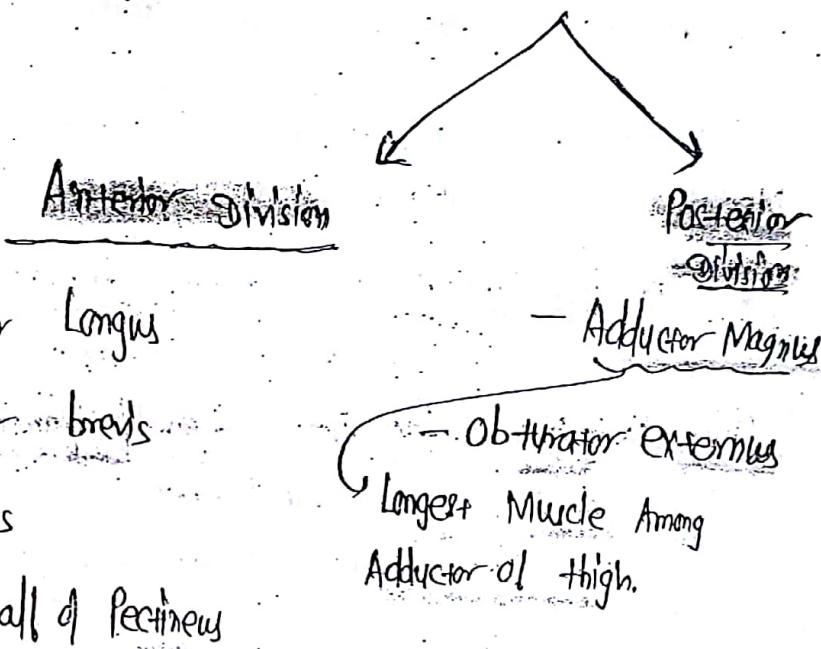
(b) Posterior Menisco-Femoral Ligament | Ligament of Wrisberg \Rightarrow
lies behind the PCL.

Nervus Wrisberg \Rightarrow Nervus Intermedius (Sensory br. of Facial Nerve)

Medial compartment of Thigh (Adductor of Thigh)

Obturator Nerve \Rightarrow Branch of Lumbar plexus

- Formed by ~~Ventral division of~~ Ventral Ramii of L₂, L₃, L₄.
- Related to Ala of the Sacrum;
- Forms the lateral boundary of "Ovarian fossa".
- Emerges out through obturator foramen & divides into



Action \Rightarrow Adduction & Medial Rotation @ Hip joint;

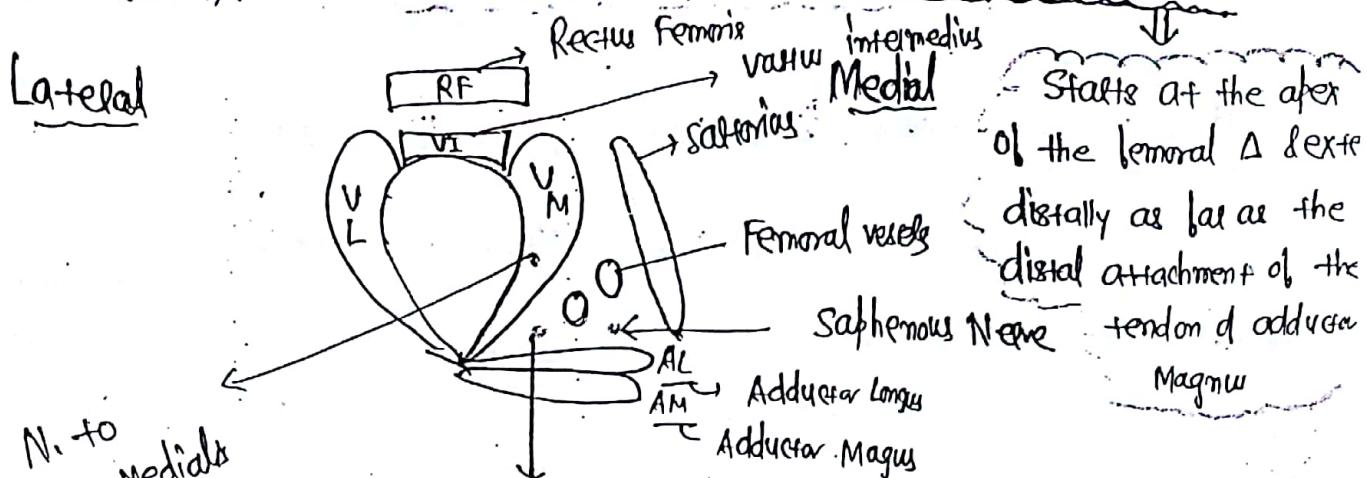
Gracilis also causes Flexion & Medial Rotation @ Knee joint
(Anti-Rapist Muscle)
(Custodian of Virginity)

Obturator externus Causes Lateral Rotation of the hip joint.

* Obturator N. supplies both hip & knee joints. In case of disease of hip joint May be referred to knee joint.

Lies beneath the Sartorius Muscle, (UP 07). Adductor Canal / Subsartorial Canal / Hunter's canal 53

Lateral



Post. division of obturator Nerve

* Saphenous Nerve is Anterior to femoral A in Adductor canal.

Boundaries \Rightarrow Anterior \Rightarrow Sartorius;

Lateral \Rightarrow Vastus Medialis;

Posterior \Rightarrow Adductor Longus & Adductor Magnus.

CONTENT OF ADDUCTOR CANAL \Rightarrow

Femoral Artery;

Femoral vein;

N. to Vastus Medialis;

Saphenous Nerve (largest cutaneous br. of Femoral)

Descending genitinal Artery

Muscular br. of Femoral Artery

Small lymph nodes

* Bursa which communicates w/ cavity of knee joint \Rightarrow Subpatellar bursa

* Inflammation of Pre-patellar bursa \Rightarrow Housemaid's knee

* Inflammation of Infrapatellar bursa \Rightarrow Clergyman knee

* Inflammation of bursa over Ischial tuberosity \Rightarrow Weaver's bottom / Tailor's / Student's

* Anselme bursa \Rightarrow Separate insertion of sartorius, gracilis & semitendinosus from tibia

Structure passing below Sustentaculum Tali

- Flexor Hallucis Longus

* Most stable position of ankle joint is \Rightarrow Dorsiflexion

* Deltoid ligament

Tibiofibular

Tibiocalcaneal

Tibiofibular

POSTERIOR COMPARTMENT OF THIGH

Hamstring Muscle

Semi-tendinosus

Semimembranosus

(Insetted on the Medial condyle of tibia; continues as the oblique popliteal ligament, which lies in

the floor of popliteal fossa)

Adductor Magnus

(Ischial Head)

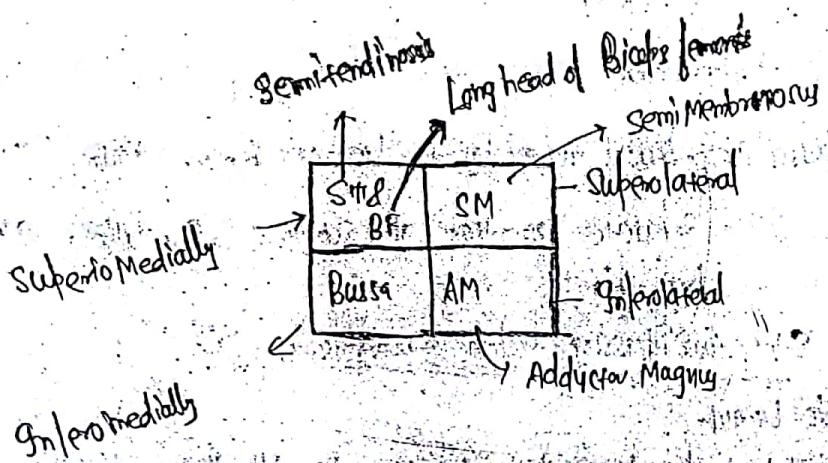
Biceps femoris

Long head

Short head

Arises from the Ischial tuberosity

Arises from Linea Aspera of Femur.



* Adductor Magnus ~~not fulfill the Hamstring criteria b/c of its insertion in femur (Not in Tibia/Fibula)~~ but wif its degenerated part it is considered as "Hamstring Muscle".

Tibial collateral ligament

Criteria for Hamstring \Rightarrow origin \Rightarrow Ischial tuberosity

Innervation \Rightarrow Tibia & fibula

N. supply \Rightarrow Tibial part of Sciatic Nerve

Action \Rightarrow Extension @ Hip joint & flexion
@ the knee joint.

Degenerative parts

* Tibial collateral Ligament \Rightarrow

\hookrightarrow degenerated part of Adductor Magnus

* Fibular collateral Ligament

\hookrightarrow degenerated part of Peroneus Longus

* oblique popliteal Ligament

\hookrightarrow degenerated part of Semimembranosus.

\hookrightarrow pierced by Middle genicular N. & vessels and the posterior division of obturator N.

* Sacrotuberous Ligament \Rightarrow

\hookrightarrow degenerated part of Long head of biceps femoris

\hookrightarrow gives origin to Gluteus Maximus.

* Sacrospinous Ligament \Rightarrow

\hookrightarrow degenerated part of coccygeus

* Articular disc of TM joint \Rightarrow degenerated part of Lateral Pterygoid

* Articularis geni \Rightarrow detached part of Vastus Intermedius.

\hookrightarrow Holds the apex of Sub-patellar bursa.

* The short head of biceps is not hamstring bld.

- (a) Arises from Lateral Aspects of femur.
- (b) Supplied by Common Peroneal part of Sciatic N.

- Biceps Femoris is inserted on head of fibula.

Glio-tibial tract

- Formed by splitting of Fascia lata;

Muscle Inserted \Rightarrow Gluteus Maximus

Tensor fascia lata.

- This tract is attached to anterior aspect of lateral condyle of tibia

- Action \rightarrow Abduction & Flexion at hip joint.

Extension at Knee joint.

Gluteus Maximus

Origin \Rightarrow a) Gluteal Surface of ilium behind the posterior gluteal line;

b) Dorsal aspect of iliac crest

c) Sacrum & coccyx

d) Sacro-tuberous Ligament

* Site of I.m. injection in buttocky

\Rightarrow Upper outer quadrant (Subero-lateral)
Site of Gluteal Region

Ingestion \Rightarrow a) Glio-tibial tract

b) Gluteal tuberosity of femur.

N. Supply \Rightarrow Inferior Gluteal Nerve

57

Action \Rightarrow Extension
Lateral Rotation
Abduction

② Hip Jntf

Gluteus Medius & Minimus

Action \Rightarrow Abduction & Medial Rotation ② Hip Jntf
Mainly by G. Medius Mainly by G. Minimus

- They support the pelvis when one foot is off the ground
- The superior gluteal nerve supply \Rightarrow Gluteus Medius

Insertion of Gluteus Medius \Rightarrow Lateral surface of greater trochanter of Femur \Rightarrow Tensor fascia latae

Insertion of Gluteus Minimus \Rightarrow Anterior surface of greater trochanter of Femur

* Key Muscle of Gluteal Region \Rightarrow Piriiformis

PELVI-FEMORAL MUSCLE

↳ Lateral Rotators of Hip

① Piriiformis

② Superior gemellus

③ Obturator Internus

④ Inferior gemellus

⑤ Quadratus Femoris

↳ N. to obturator Internus

↳ N. to Quadratus Femoris

* Structure Passing Above the Piriiformis: \Rightarrow ① Superior gluteal Nerve
② Superior gluteal vessels

Sciatic Bed - It is formed by →

- (1) Superior gemellus
- (2) Obturator Internus
- (3) Inferior gemellus
- (4) Quadratus Femoris
- (5) Adductor Magnus

Popliteal Fossa

Boundaries → Superolateral ⇒ Biceps Femoris

Superomedial ⇒ Semitendinosus & Semimembranosus
assisted by Sartorius & Gracilis

Glenolateral ⇒ Lateral head of Gastrocnemius

Glenomedial ⇒ Medial head of Gastrocnemius

Floor ⇒ Popliteal Surface of Femur,
capsule of the knee joint.

Oblique popliteal Ligament

Popliteal Muscle

Fascia covering the Popliteal Muscle

Contents → Popliteal Artery (deepest)

dy

Popliteal vein

Sciatic Nerve & the Tibial & Common Peroneal Nerve

* Popliteal artery is difficult to palpate b/c

It is Not superficial & doesn't pass over any bony prominence.

POSTERIOR COMPARTMENT OF LEG

SUPERFICIAL MUSCLE ⇒

Gastrocnemius + Soleus

↳ Triceps surae

K/a "Posterior heart"
b/c it helps in venous return from lower limb

Action ⇒ Plantar flexion @ Ankle joint

Gastrocnemius

Soleus

Plantaris

Tendo Achille's

↳ Inserted on Middle 1/3rd of posterior surface of calcaneum.

Feeble & Rudimentary Muscle; which can rupture during sudden dorsiflexion of Ankle joint.

DEEP MUSCLE ⇒

Muscle

Popliteus → Unlocking of the knee joint

Tibialis posterior

Flexor hallucis longus

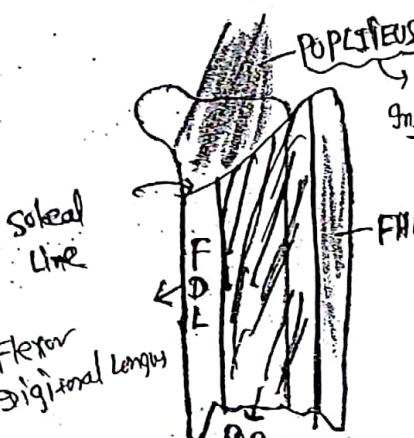
Flexor digitorum longus

Action

→ Plantar flexion & inversion

N. Supply ⇒ Tibial Nerve

Artery ⇒ Post. tibial artery



STRUCTURE passing behind the Flexor Retinaculum through Palmaris longus

(Ant. to Posterior)

- Tibialis Posterior
- Flexor digitorum Longus
- Post. tibial A.
- Tibial nerve

Mnemonic ⇒ The Doctors Are Not Here

ANTERIOR COMPARTMENT OF LEG

- ① Tibialis Anterior;
- ② Extensor hallucis Longus;
- ③ Extensor digitorum Longus;
- ④ Peroneus tertius;

Action \Rightarrow Dorsiflexion @ ankle joint;

- Tibialis anterior also causes Inversion & acts as a sling for the Medial Longitudinal Arch.

Nerve \Rightarrow Deep Peroneal N.

Artery \Rightarrow Ant. Tibial A. - after piercing the Interosseous Membrane

Structure passing behind the Extensor Retinaculum

Medial to Lateral \Rightarrow Tibialis Anterior

Extensor hallucis Longus

Anterior tibial A.

Deep Peroneal Nerve

Extensor digitorum Longus

Peroneus tertius

Mnemonic:

The Himalaya Are Not Dry Plateau

LATERAL COMPARTMENT OF LEG

Muscle \Rightarrow Peroneus Longus

Peroneus brevis

Nerve \Rightarrow Superficial Peroneal N.

Artery \Rightarrow Peroneal A. = branch of Posterior tibial A.

Action \Rightarrow Eversion of foot.

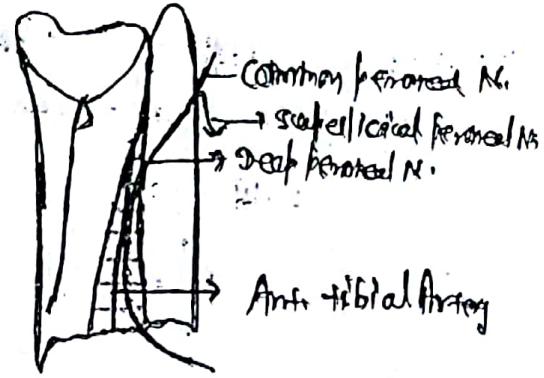
- Act as a sling for the Lateral Longitudinal arch.

* ~~Foot drop occurs due to injury to common peroneal nerve / deep peroneal nerve~~

* "High Stepping / Stomping Marching" Gait

Nervi ItaliensDeep Peroneal Nerve

It descends to cross the Anterior Tibial Artery.

Tibialis Posterior

- Winds around the Medial Malleolus.
- Chiefly inserted on Navicular tuberosity.
- Sends slips to all the Tarsals & Metatarsals except → Palmaris brevis
Metatarsal
- the tendon which winds around Lateral Malleolus

Peroneus brevis

Inserted on base & tuberosity of 5th Metatarsal bone

Peroneus Longus

goes behind the Peroneus brevis till the cuboid; then turns @ right angle; grooves the cuboid; passes below the bases of Metatarsal bones.

Tibialis Anterior

- Inserted on Lateral aspect of base of the 1st Metatarsal & Medial cuneiform
- Medial cuneiform bone Receives the insertion of → Tibialis Anterior
Tibialis Posterior

LAYER OF SOLEGreat toe

1st Layer → Abductor hallucis brevis

2nd Layer → FHL; FPI; Lumbricals

3rd Layer → Flexor hallucis brevis

4th Layer → Tibialis Posterior

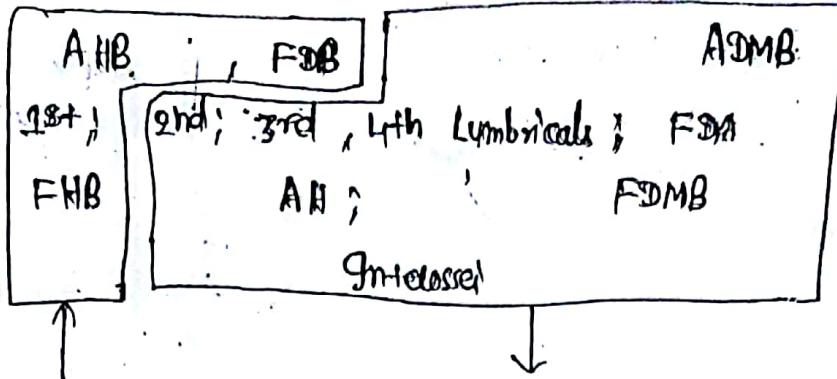
Flexor digitorum brevisAdductor hallucisPeroneus Longus

Abductor digiti minimi brevis
Flexor digitorum accessorius/
Quadratus plantae

Flexor digitorum profundusIntensor4 Dorsi3 Plantar

Great Toe

1st Level
2nd Level
3rd Level
4th Level



Little Finger

Medial plantar N.
+
Medial 3rd finger on
plantar aspect

Lateral plantar N.

Lateral 1st finger on plantar aspect,

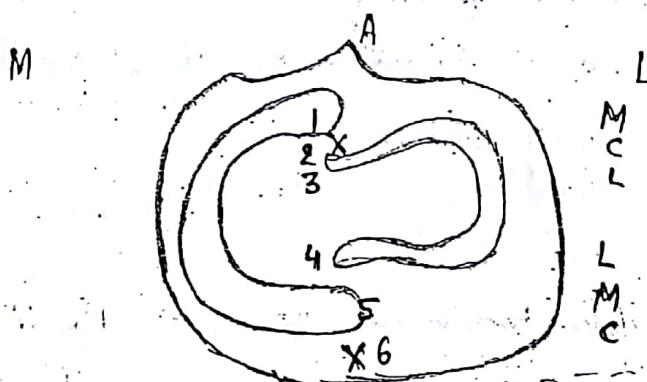
* Strongest Ligament @ hip joint \Rightarrow Glio-femoral / Ligament of Bigelow

the stem of "Y" is attached to
Anterior Inferior Iliac Spine; two
limbs are attached to Infra-trochanteric line

\leftarrow Quadrated "Y" shaped

↓
prevents hyperextension @ Hip Joint
prevents trunk to be falling down backward.

* Structure attached to Intercondylar eminence of Fibia! \Rightarrow



ACL (Intra capsular & intra-synovial)

① Anterior horn of Medial Meniscus \rightarrow Attach to the Posterior aspect of Medial surface of Lateral condyle

② Anterior Cruciate Ligament \rightarrow Prevents Anterior displacement of tibia on Femur

③ Anterior horn of Lateral Meniscus

④ Posterior horn of Lateral Meniscus

⑤ Posterior horn of Medial Meniscus

⑥ Posterior Cruciate Ligament

\rightarrow Attach to the Posterior aspect of Medial surface of Lateral condyle

\rightarrow Prevents Anterior displacement of tibia on Femur

\rightarrow Gets torn during extension

PCL (Intra capsular & extra synovial)
 \rightarrow Attach to Anterior aspect of Lateral surface of Medial condyle

\rightarrow prevents the posterior displacement of tibia on Femur

\rightarrow gets torn during flexion

See page 1 & last page after this page

THORAX

- Head of the Rib articulates w/ the body of thoracic vertebrae
via "Costo-Vertebral Joint"
- Tubercle of the Rib articulates w/ transverse process
via "Costo-transverse Joint"
- Shaft of the Rib articulates w/ costal cartilage
via "Costo-chondral joint"

Bucket - handle movement changes \Rightarrow Transverse diameter of thorax

Pump - handle movement changes \Rightarrow AP diameter of thorax

Contraction of diaphragm changes \Rightarrow vertical diameter of thorax.

* Ossification of Ribs begins near the angle towards the end of 2nd month (Arama 8th week) of fetal life & is seen firstly in 6th & 7th Ribs.

Intercostal Space

Intercostal Muscles \rightarrow EICM

IICM

Transverse thoracicus

Stero-costalis



Anteriorly brt.

Ginnermost intercostal



Laterally

Sub costalis



Posteriorly

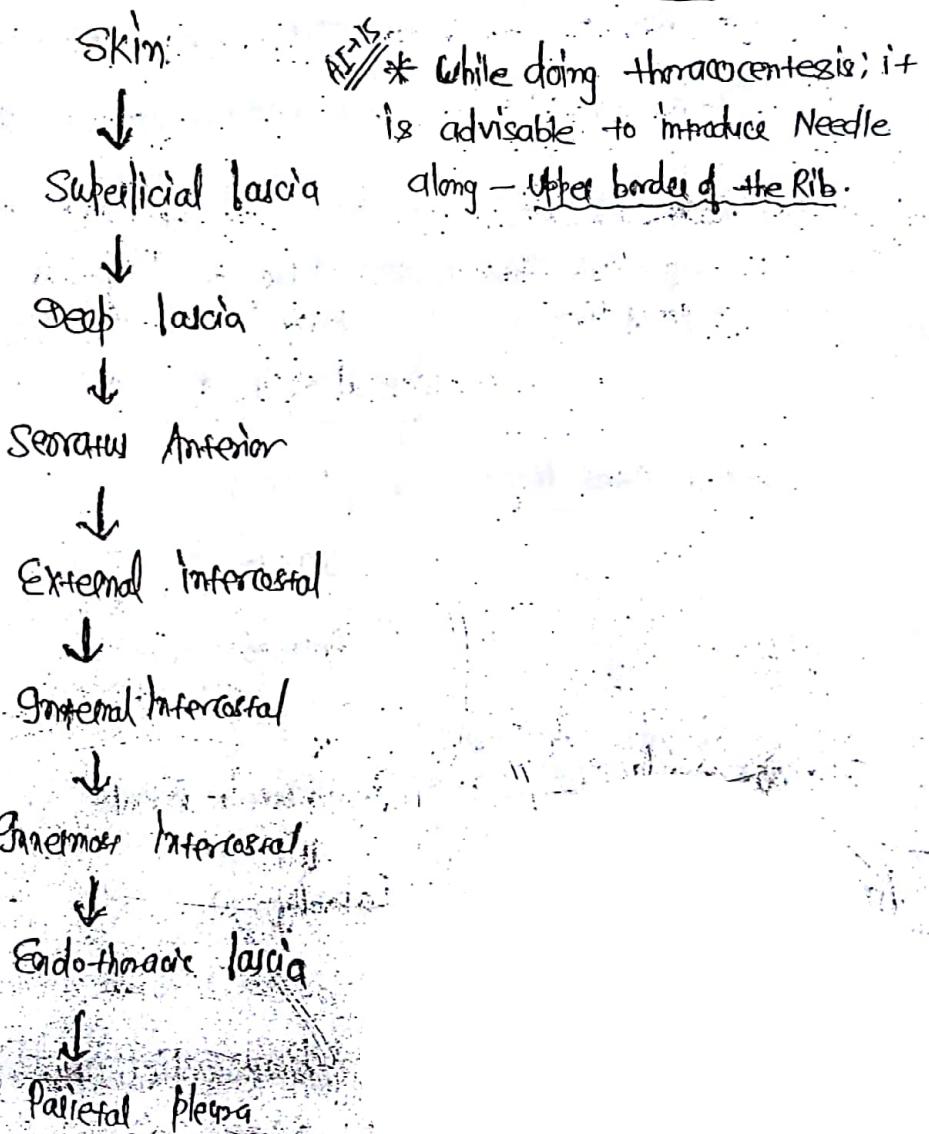
* The Neurovascular plane of thorax lies b/w internal & innermost intercostal in the costal groove along inferior border of the Rib
(Vein \rightarrow Artery \rightarrow Nerve)

→ This sequence is Reversed in 1st Rib ($N \rightarrow A \rightarrow V$)

* Neurovascular plane of body ↗

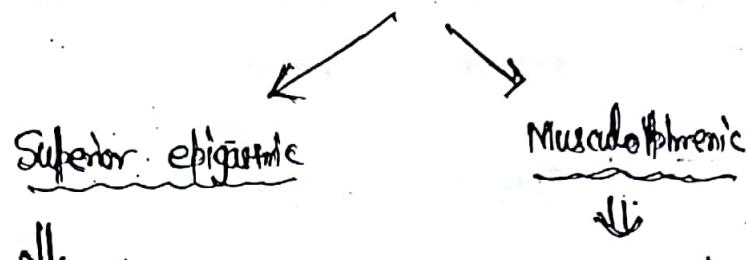
<u>Neck</u>	Scalenus Posterior	Scalenus Medius	{	Scalenus Anterior
<u>Thorax</u>	External intercostal	Internal intercostal		Innermost intercostal
<u>Abdomen</u>	External oblique	Internal oblique	{	Transverse abdominis
<u>NEST Dec 12</u>				

* Structure pierced during pleural tapping in Mid-axillary line ↗



Internal thoracic Artery

- Branch of 1st part of Subclavian A.
- Lies on either side of the sternum;
- At the six I/C space divides into :



- Enters the abdomen through "Foramen of Morgagni / Space of Lary".
- Supplies the Intercostal muscle & diaphragm.
- gives Anterior I/C arteries in Lower spaces
- Anastomosis w/ the Inferior epigastric A.; which is the branch of external iliac A.

Anterior Intercostal Artery

- In the upper six I/C spaces a branches of Internal thoracic Artery.
- In the Lower spaces the branches of Musculophrenic Artery.
↳ i.e. 7th - 9th I/C spaces
- There are two Anterior Intercostal arteries in each space.

Posterior Intercostal Artery

- In the ^(3rd-11th) Lower I/C spaces are branches of descending thoracic Aorta.
- In the upper two spaces they are branches of

↑
Superior Intercostal A.

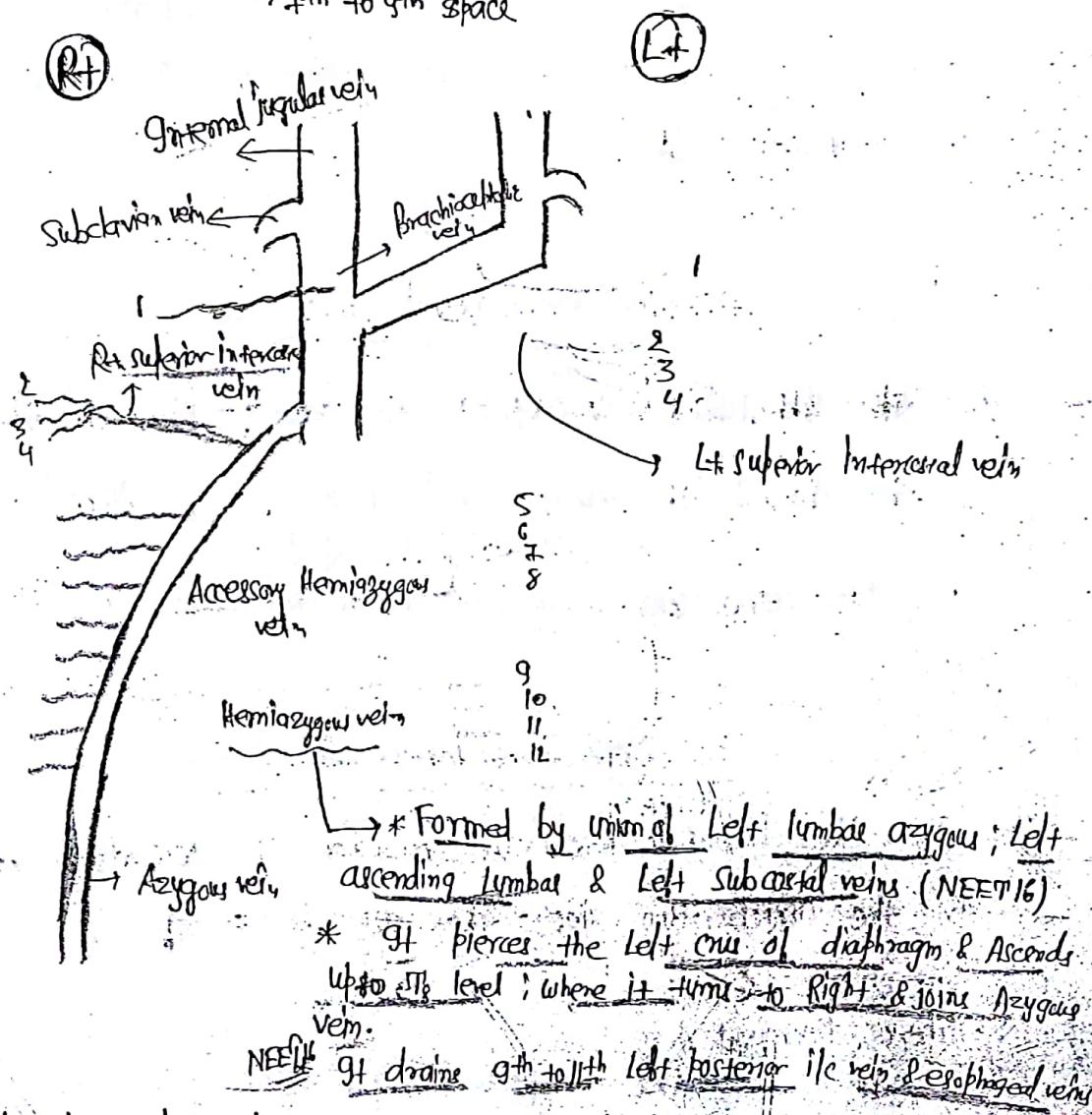
branch of costo-cervical trunk

Branch of 2nd part of Subclavian A.

- There is one Posterior ilc Arteries In each side.
- At the angle of Rib, it gives a collateral branches.
- The two Posterior ilc Arteries anastomose to two Anterior ilc Arteries at the costo-chondral junction,
- R+. Posterior ilc artery are longer than the Left.

Anterior intercostal veins

- In the upper six spaces drains into → Internal thoracic vein
- In the lower spaces drains into → Musculophrenic vein
↳ 7th to 9th space



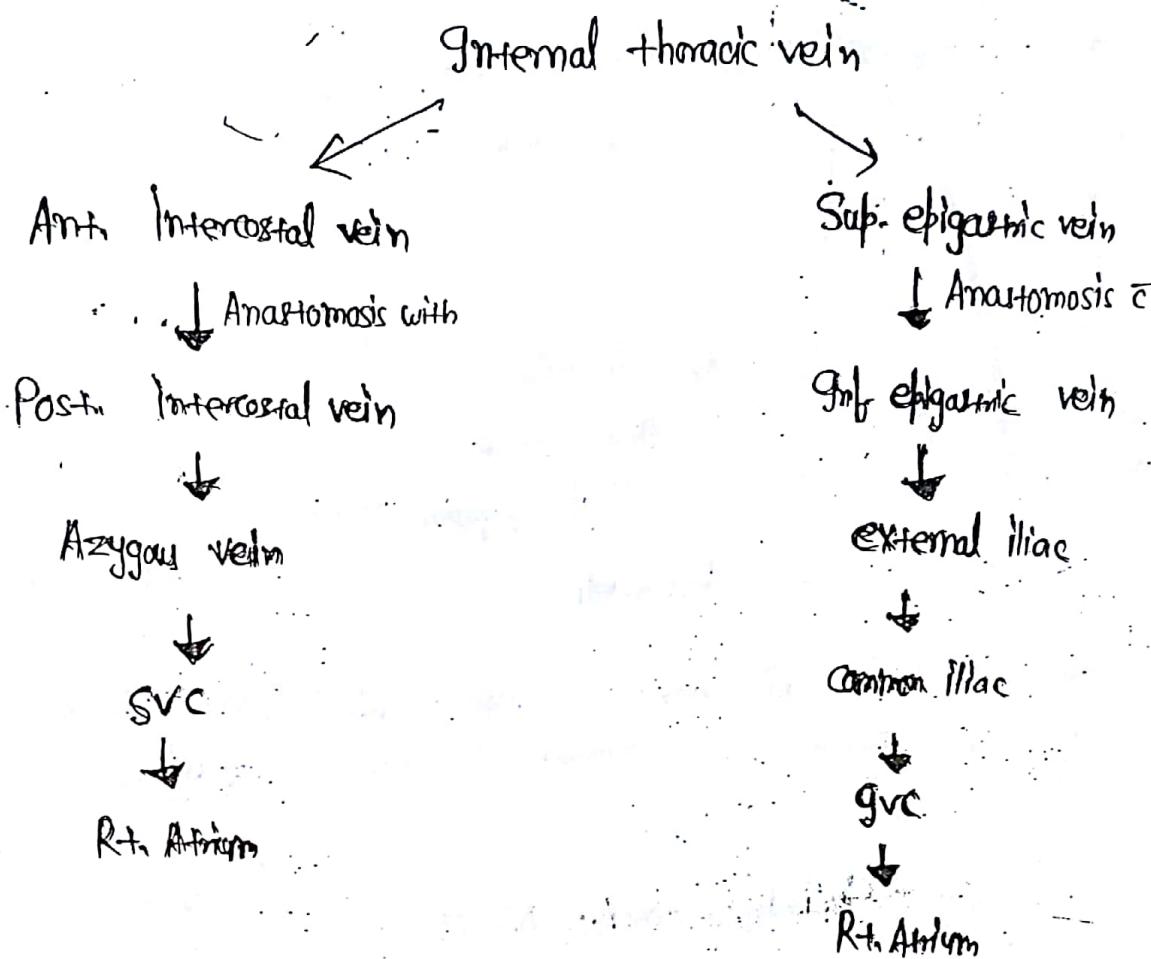
* Right bronchial veins drain into Azygous vein & left bronchial veins drain into Left Superior intercostal or hemiazygous vein

Q9

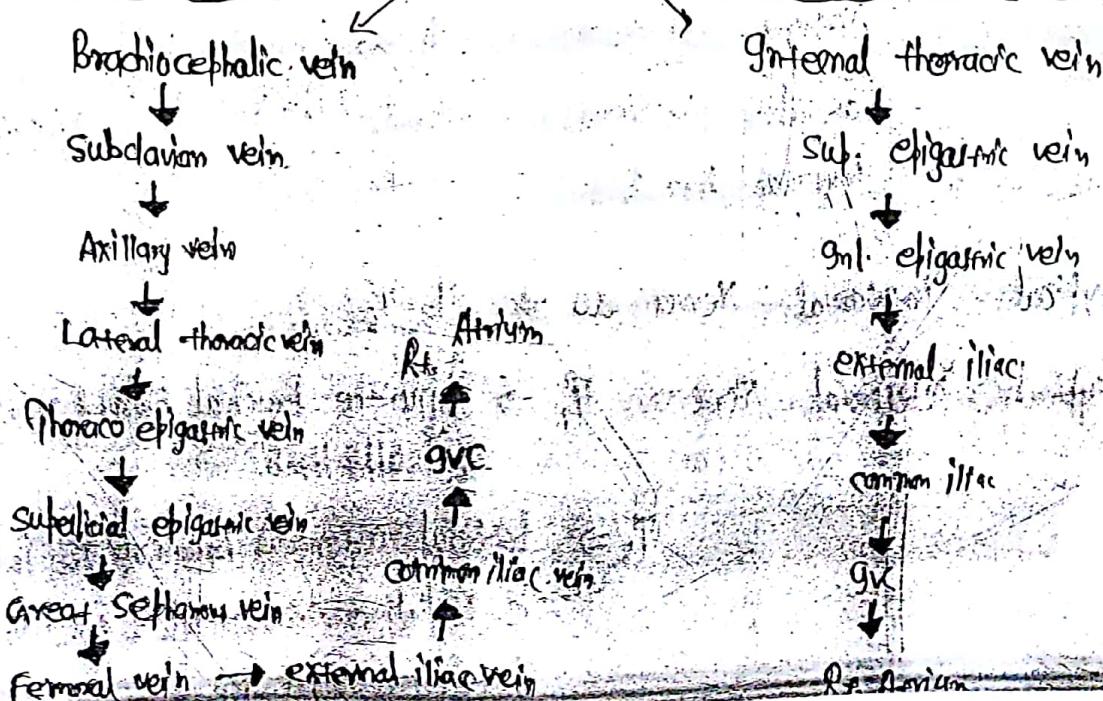
Internal thoracic veins, all tributaries of \Rightarrow Brachiocephalic vein

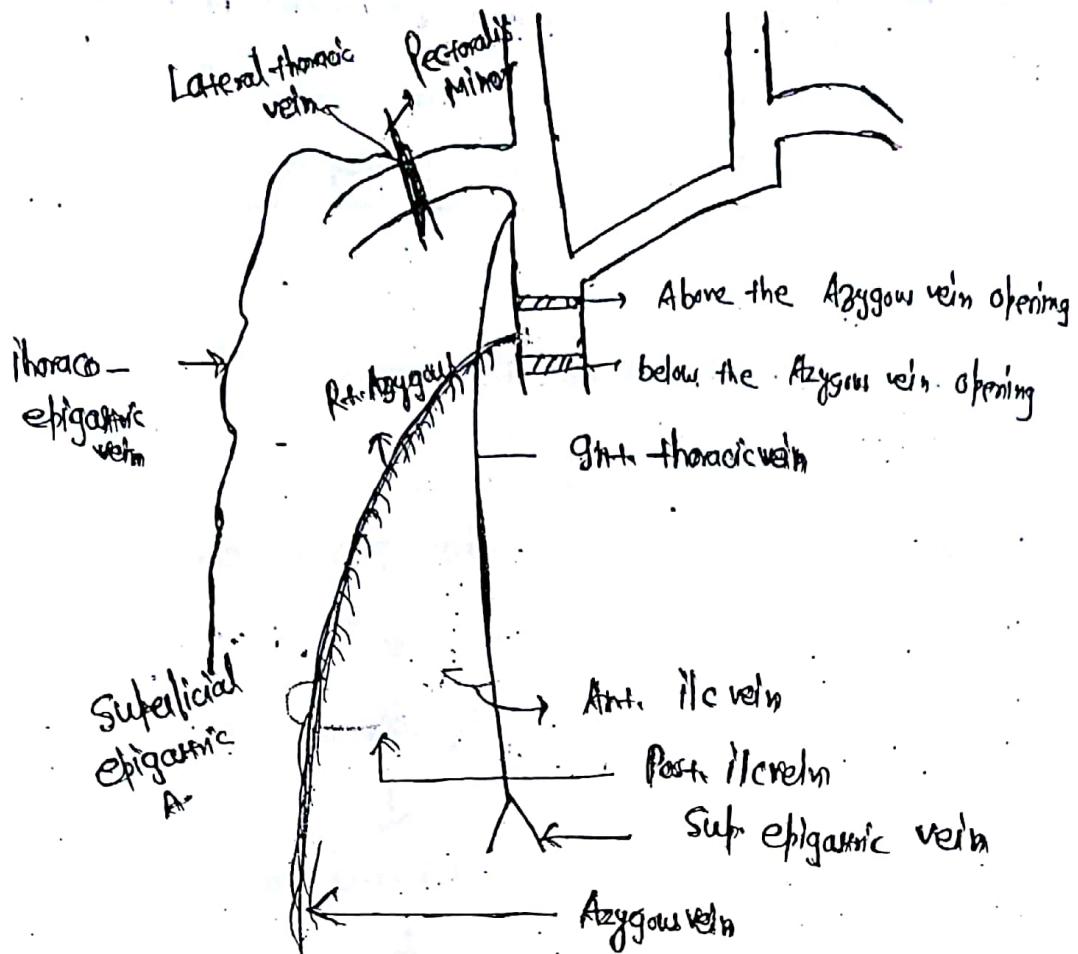
69

Obstruction to the SVC above the opening of Azygous vein \Leftrightarrow



Obstruction to the SVC below the opening of Azygous vein \Leftrightarrow





* Trachea & Branchii have cartilage (hyaline cartilage) in their walls, while wall of bronchioles & terminal bronchioles don't contain cartilage.

Intercostal Nerve

- It is the ventral ramus of a thoracic spinal nerve
- Branches \Rightarrow Antero-cutaneous branch; } Anything else if it is
Lateral-cutaneous branch; } Supplying; it is \Rightarrow Atypical
Muscular branch,
- Typical Intercostal Nerves are $\Rightarrow T_3-T_6$
- Atypical Intercostal Nerve $\Rightarrow T_1 \Rightarrow$ Joins the brachial plexus & supplies the upper limb,
 $T_2 \Rightarrow$ Lateral cutaneous branch of T_3 joins
C Medial cutaneous nerve of arm via
Intercostobrachial

→ The Lower I_C Nerves supplies the Muscle of Anterior Abdomen
wall (T₇-T₁₂).

- * Parietal Pleura is pain sensitive & supplied by I_C & Phrenic N.
- * visceral Pleura is pain insensitive & supplied by Autonomic Nerv.

PLEURA & LUNG

Mid-clavicular
LUNG → 6th Ribs

Mid-axillary
8th Ribs

Mid-scapular
10th Ribs

PLEURA → 8th Ribs

10th Ribs

12th Ribs

* Pulmonary / visceral pleura is supplied by Sympathetic (T₂-T₆ segm) & Parasympathetic (Vagus N.)

* The Mediastinal & diaphragmatic pleura are supplied by Phrenic Nerve

* The costal & cervical pleura are supplied by Intercostal Nerve

* Axilla of the Lung projects 5 cm above the 7th Rib & 25 cm ab
the clavicle.

Covered by Cervical Pleura

Further covered by Sibson's fascia / Cervic thorac

Diaphragm / subperitoneal Membrane

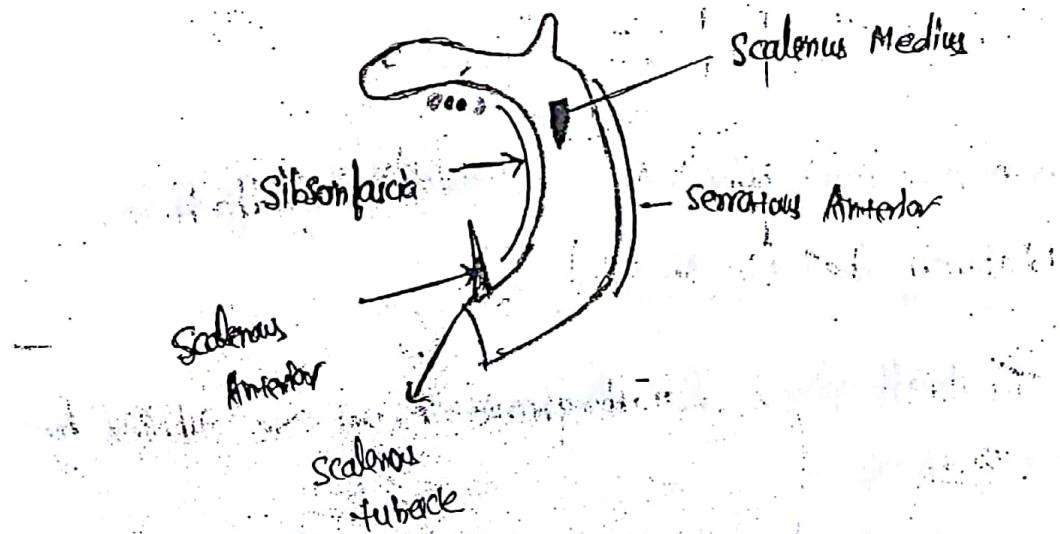
Sibson's fornia \Rightarrow Extends from transverse process of C₇ to inner border of 1st Rib laterally.

Oral-diaphragm \Rightarrow Formed by Mylohyoid;

Pelvic-diaphragm \Rightarrow Formed by Levator Ani;

Urogenital-diaphragm \Rightarrow Formed by Sphincter Urethrae
Duct transverse perinei

\rightarrow Structure attaches to the 1st Rib \Rightarrow



CHASSAGNAC TUBERCLE \Rightarrow Ant. tubercle of transverse process of C₆ vertebrae.

Relation of the Neck of 1st Rib \Rightarrow ① Sympathetic chain

② Posterior I/Ic vein

③ Sub. Intercostal Artery

④ 1st Thoracic Nerve

SVAN (Med -> Lateral)

Relation of Ala of Sacrum → Sympathetic Chain

SLIO (Med → Lateral)

Lumbosacral trunk

Glo Lumbal Artery

Obturator Nerve

* TRUE RIBS → Directly articulates w/ sternum through costal cartilage e.g. 1st to 7th Ribs

* FALSE RIBS ↳ 8th to 12th Ribs don't articulate directly w/ the sternum.

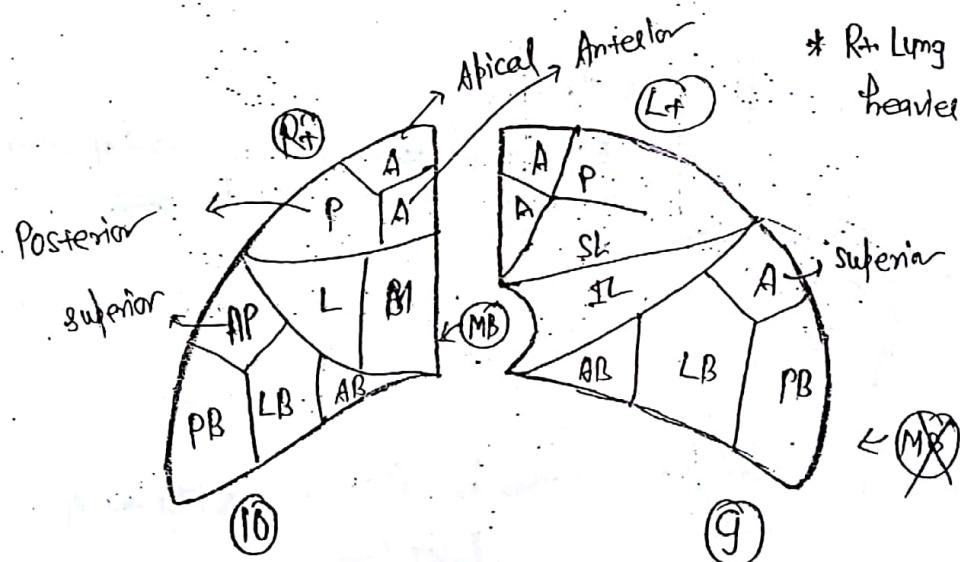
NEE18 → 8th, 9th & 10th Ribs are attached to 7th Ribs by Syndesmotic points.

* 11th & 12th Ribs have No costal cartilage & they have Anterior ends (Floating Ribs).

→ Surgically Resectable.

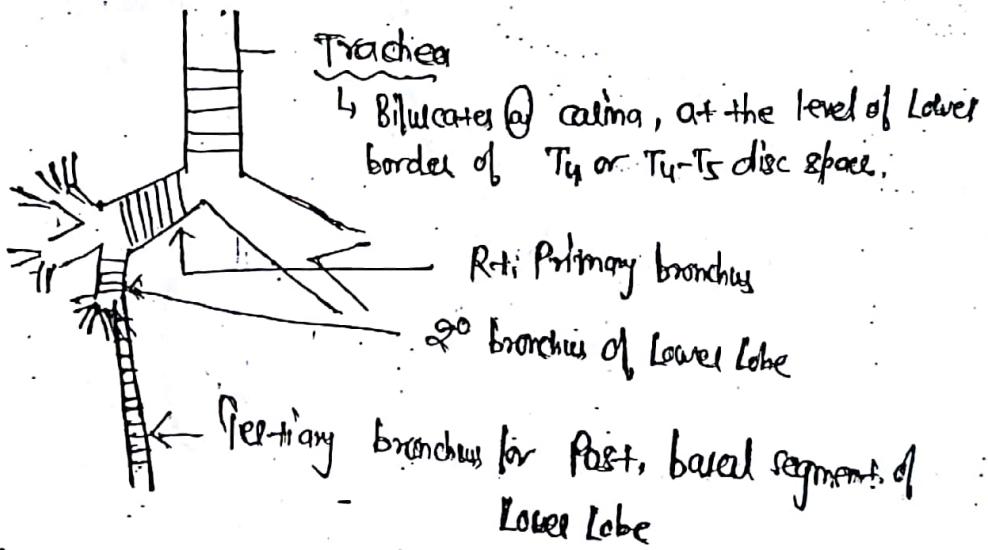
BRONCHOPULMONARY SEGMENT → Largest subdivision of a Lobe

— Part of the Lung supplied by one Parietal branch.



* R+ Lung is shorter; wider & heavier (625gn) than Left Lung (565g).

- Each broncho pulmonary segment is critical in shape.
- It has Pulmonary Artery & Tertiary bronchi.
- The Pulmonary veins are Intersegmental.
- A foreign body entering the Nose enters into Posterior basal segment of the Right Lung.
- Aspiration Pneumonia is common in \Rightarrow Apical segment of Lower lobe / Superior segment of Lower lobe
OR
Posterior segment of Upper lobe
- b/c of most dependent part of lung while in suffocating position.



- * Structure which arches over the hilum of Rt. Lung \Rightarrow Azygous vein
- Structure which arches over the hilum of Lt. Lung \Rightarrow Arch of Aorta

Nerve in front of hilum \Rightarrow Phrenic N.

Nerve Behind hilum \Rightarrow Vagus N.

- * Bronchial Arteries supply the Lung till the beginning of Respiratory bronchiole (conducting part) & then Anastomose w/ Pulmonary arteries

HEART & PERICARDIUM

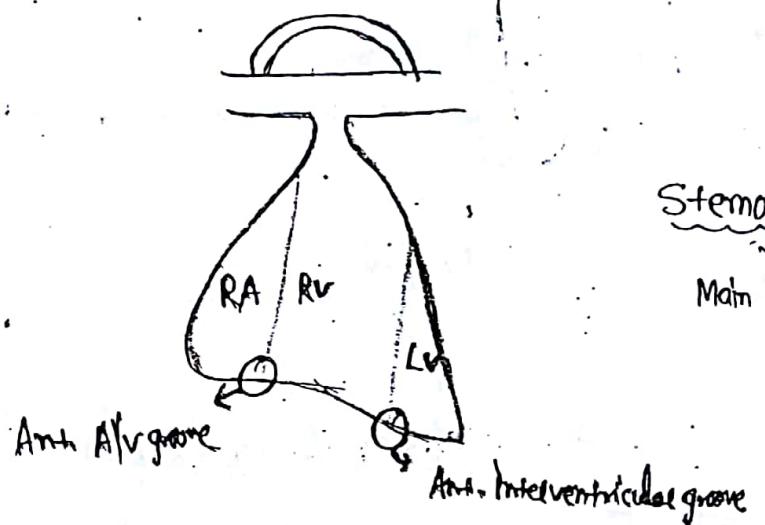
Sternocostal surface of heart \rightarrow

\hookrightarrow Sympathetic innervation of heart

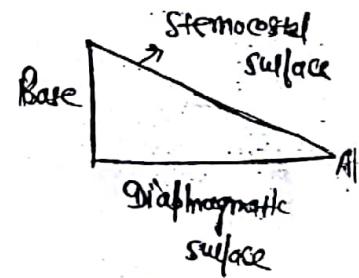
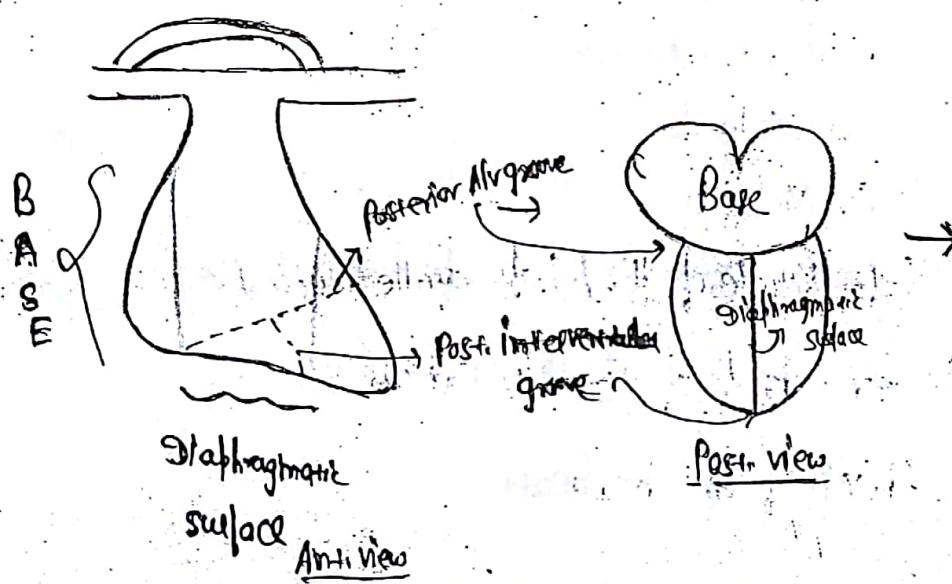
\hookrightarrow T₁-T₅ (cardiostimulatory)

* Parasympathetic innervation of heart

\hookrightarrow Vagus Nerve (cardioinhibitory)



Sternocostal surface of heart
Main part \Rightarrow "R. ventricle"



* Major part by Left Atria

Base of the heart is formed by \Rightarrow Both the Atria

* The groove which separate base from Diaphragmatic surface

Posterior A/V groove

* Apex of the heart is formed by \Rightarrow Left ventricle

Right Ventricle \rightarrow Most Anterior (sternocostal) surface of heart: it forms inferior border

- Triangular in shape

- In cross section it appears like a crescent.

- Wall thickness \rightarrow 3-5 mm

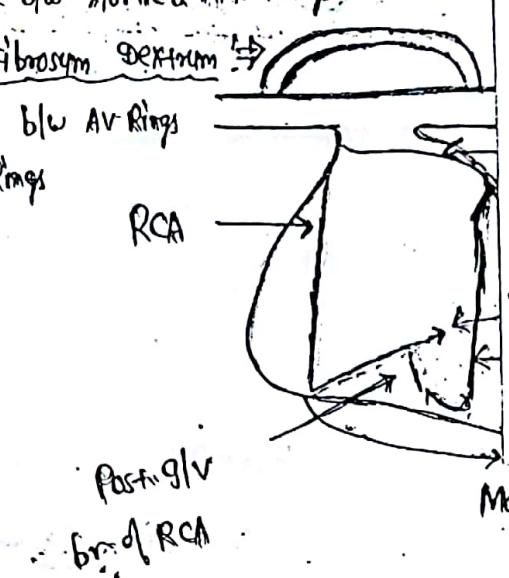
k Trigonum Fibrosum Sinistrum ↗

Fibrous tissue b/w Aortic & Mitral Rings.

k Trigonum Fibrosum Dextrum ↗

Fibrous tissue b/w AV Rings

& Aortic Rings



Heart Valve	Surface Marking	Auscultatory Area
MITRAL	Sternal end of Left + 4th costal cartilage	Cardiac Apex.
TRICUSPID	Right half of sternum along 4th & 5th intercostal spaces	Right Lower end of sternum.
AORTIC	Sternal end of Left 3rd costal cartilage	Right 2nd intercostal space
PULMONARY	Sternal end of Left 3rd costal cartilage (upper end)	Left 2nd intercostal space

Right coronary Artery (RCA)

Supplies ⇒

Right Atrium ;

Right ventricle ;

SA Node ;

AV Node

Left bundle of His (Left bundle branch)

Posterior 1/3rd of the I/V septum

Apex - of the heart

LCA (Left coronary Artery)

Supplies ⇒

Left Atrium

Left ventricle

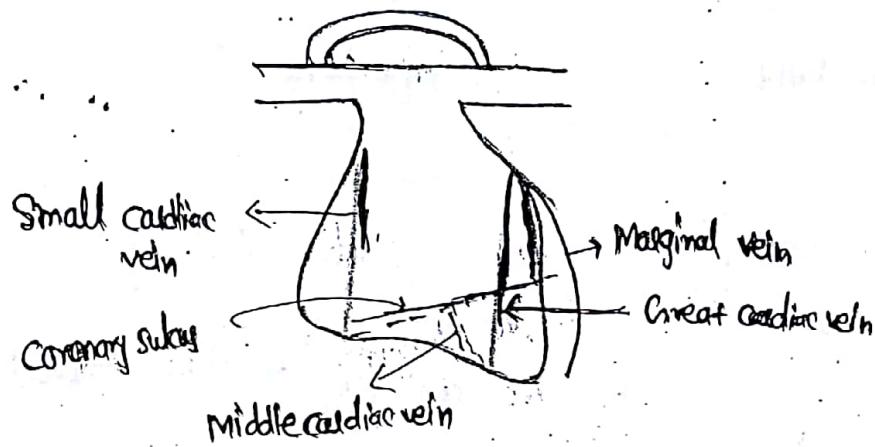
Left & Right Bundles of His

Anterior 2/3rd of I/V septum

Apex of the Heart

- * The Posterior iv artery is the branch of Rt. coronary
- In 85% of the cases \Rightarrow Rt. Coronary dominance
- * if it is a branch of circumflex \Rightarrow Lt. coronary dominance
- * if both gives this branch \Rightarrow Co-dominance

VEINS OF HEART



Q Coronary sulcus is \Rightarrow Posterior A/V groove

Q All the veins drains in coronary sinus except

Anterior cardiac vein

Vene cordae Minimi (Thebesian vein)

drain into

Rt. Atrium

* Oblique sinus of the pericardium lies behind Lt. Atrium.
to accommodate more blood coming from Pulmonary veins

Right Atrium

The Line joining SVC to gvc from outside is Klaas
"Sulcus terminalis"

The Same Line from Inside is Klaas "Marginalis terminalis"

It divides Rt Atrium



Rough part



Shows Structure Similar
to teeth of comb



Smooth part



Shows the opening of

- SVC & gvc Guarded by Eustachian valve

- Coronary sinus - Guarded by Thebesian valve

Klaas "Muscular Pecten"

Fossa ovalis is Represented by "septum primum"

Limbus Fossa ovalis is Represented by "septum secundum"

Triangle of Koch -

Boundaries → ① Septal Leaflet of Tricuspid valve

② Opening of coronary sinus

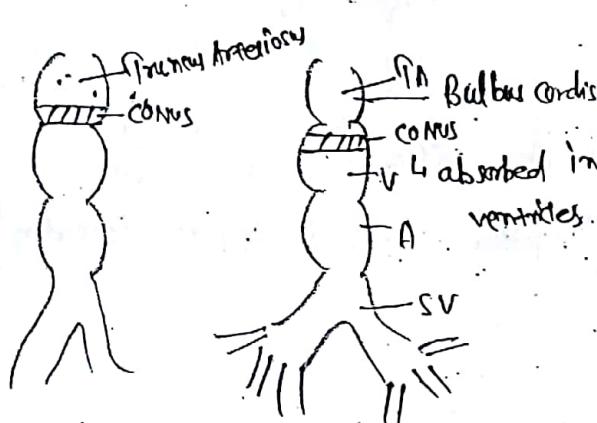
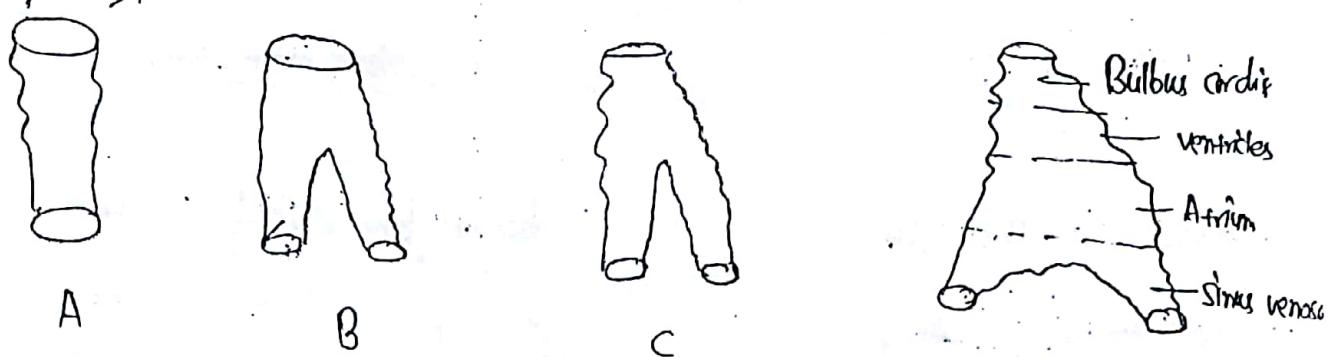
③ Pendan of tendon

AV Node lies in this triangle

SA Node lies in the junction of SVC & Rt Atrium

Embryology of Heart & Blood vessels

Heart tube is formed by hyaluronic acid secreted by Myocardium (NEET'16)
 Heart tube or Tubular heart is formed at \rightarrow 3 weeks (NEET'16)



* Veins draining in the Sinus venosus

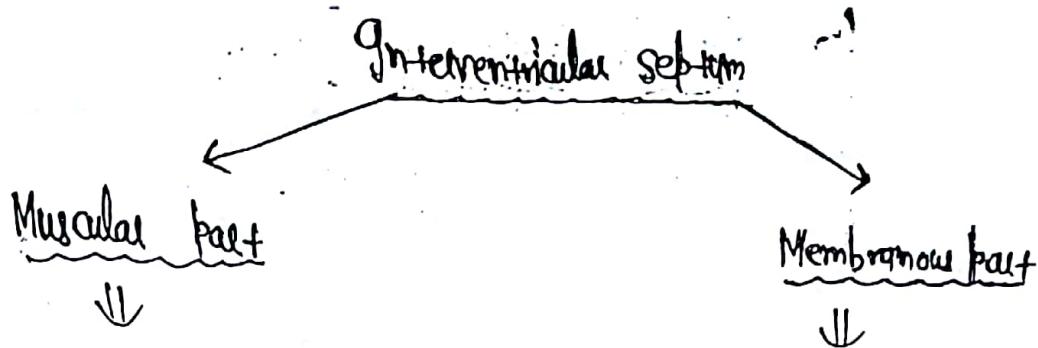
- Development of Right Atrium \Rightarrow
- PART
- Smooth Posterior wall \rightarrow Right horn of Sinus venosus
- Rough Anterior wall \rightarrow Primitive Atrial chamber
Interaltrial septum \rightarrow Septum primum & secundum
min. forms \rightarrow Portal vein, Hepatic vein, enteric vein & hepatic segment of IVC
develops from \Rightarrow Right vitelline vein, Left vitelline vein & Dorsal Aorta (anastomosis of two).

- ② Vitelline from Yolk sac;
- ③ Common cardinal from body wall

* Fate of Sinus venosus \Rightarrow The Rt. & left horn of Sinus venosus opens in the Atrium through Sino atrial orifice

- The left horn becomes small in size; gets detached from the atrium forms coronary sinus and now opens into the Rt. horn.
- The Right horn is absorbed into the atrium \Rightarrow Septum secundum
if it is bounded by Left & Right Venous valve

The Left venous Interaltrial septum &



Grows in the floor of
the ventricular cavity

derived from \Rightarrow ① Bulbar septum

Formed in sinus

⑥ Proliferation of AV cushion.

- Final closure of foramen ovale occurs after fusion of "Septum primum & Septum secundum".

Truncus arteriosus \Rightarrow The Aortico-pulmonary septum divides the truncus arteriosus into Ascending Aorta & Pulmonary trunk.

- Failure of migration of Neural crest cells in this segment results in
 - ① TOF \Rightarrow Major cyanotic congenital heart defect
 - occurs when septum shifts anterior & to the right; leading to \Rightarrow Pulmonary stenosis, RVH;

Membranous IVS defect
Overriding of Aorta

② Transposition of great vessels \Rightarrow

\hookrightarrow occurs when Septum fails to develop into

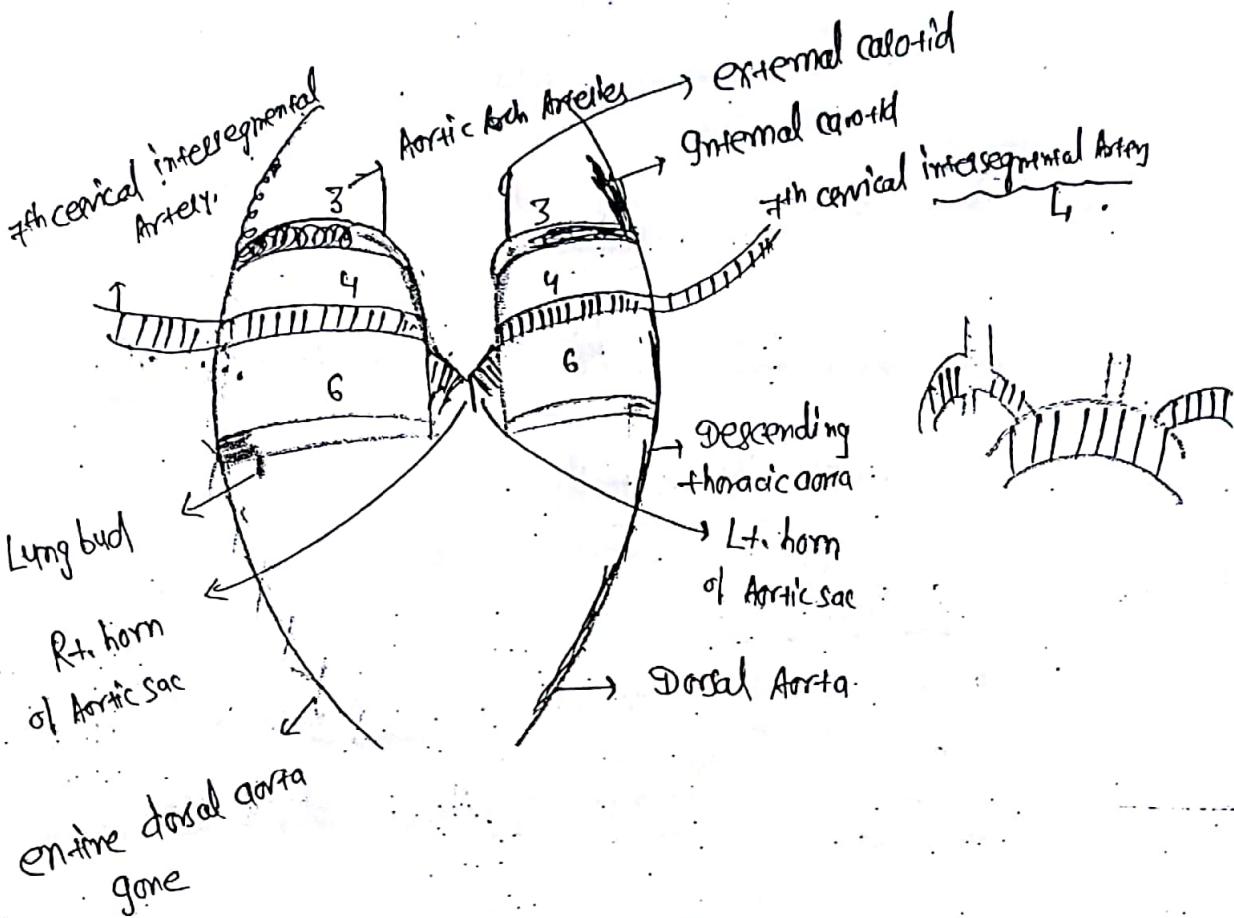
Spiral Membrane

Aorta arises from Right ventricle

MCC d. cyanosis immediately after birth

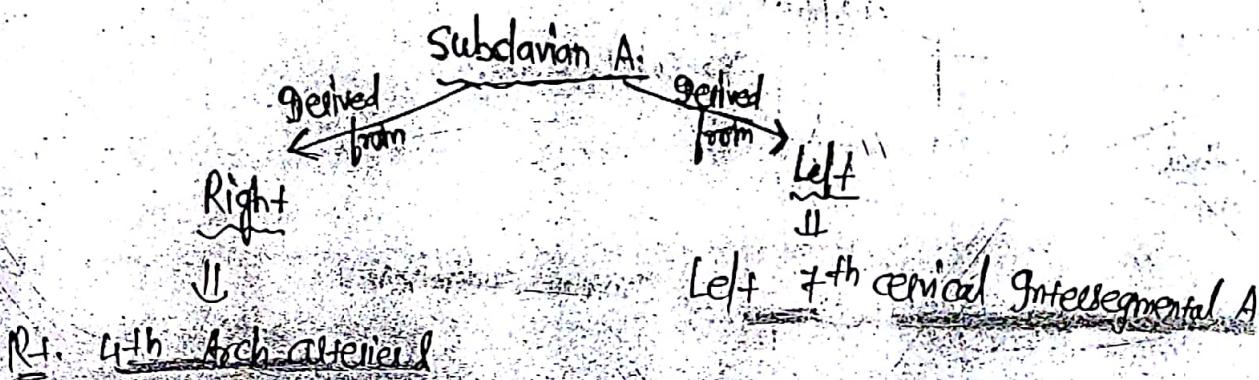
③ Persistent truncus arteriosus \Rightarrow

L occurs when septum fails to develop; a single vessel carry blood from both ventricles.



ARCH OF AORTA

derived \rightarrow Left horn of Aortic Sac & the left 4th arch artery.



Brachiocephalic trunk

derived from \Rightarrow R.t. horn of Aortic Sac

Pulmonary Arteries

derived from - 6th arch arteries

Pulmonary Artery

derived from - Left 6th arch arteries b/w lung bud & the dorsal Aorta

Common carotid

derived from - 3rd Arch arteries

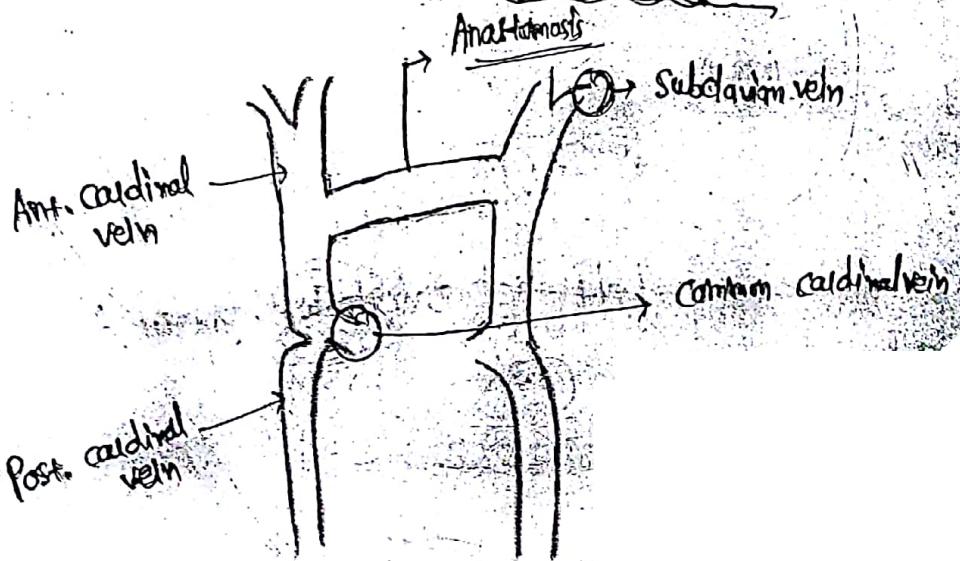
- it gives a bud for external carotid & itself continues as internal carotid along with dorsal Aorta

Descending thoracic Aorta

- derived from Left dorsal Aorta

Development of vein

Anastomosis



Internal Jugular vein

- derived from Ant. cardinal vein above the attachment of subclavian vein.

Right Brachiocephalic vein

Derived from \Rightarrow Rt. Ant. cardinal vein b/w subclavian vein & Anastomosis

Lt. Brachiocephalic vein

Derived from \Rightarrow Lt. Ant. cardinal vein subclavian vein & Anastomosis & Anastomosis itself

Superior Vena Cava

derived from \Rightarrow Rt. Anterior cardinal vein below Anastomosis,

Rt. Common cardinal vein

A left sided SVC drains into \Rightarrow Coronary Sinus

Develops from \Rightarrow

Coronary Sinus

- Lt. common cardinal vein
- Lt. horn of sinus venosus

* Left. Superior v/c veins \Rightarrow derived from left. Anterior cardinal vein below the anastomosis

Proximal part of left. Posterior cardinal vein.

Diaphragm

derived from \Rightarrow
Septum transversum

- Dorsal & ventral Mesentery of oesophagus;
- Body wall
- Pleuro-pertitoneal Membranes
- Muscles are derived from \Rightarrow Cervical Myotomes
- Bochdalek's Hernia \Rightarrow A Postero-lateral defect in the development of diaphragm $\&/+$ Non-fusion of pleuro-pertitoneal Membrane.

Root of

- Lies opposite to 7th T
- Arrangement of structures
- Anterior to Posterior \rightarrow
(V-A-B)

Superior to Inlet \rightarrow

Right

Left

ANSWER
ONBIS:

- Pulmonary Artery
- Bronchus (1st Bronchus)
- Pulmonary vein

NEETIG

- Eparterial bronchus (superior Mast.)
- Pulmonary Artery
- Hyparterial bronchus
- Inferior pulmonary vein (inferior Mast.)

MEDIASTINUM

- Middle space left in thoracic cavity in b/w. the lungs.
- divides into Superior & Inferior by a imaginary line from 8-tertial Angle to lower border of T_4 . (NEET'IC).

(I)

Superior Mediastinum \Rightarrow

Retrosternal

- Sternohyoid Muscle
- Sterno-thyroid Muscle
- Thyroid

InterMediate

- Formation of SVC
- Arch of Aorta & its branches
- Vagus & Phrenic N.

Pre-vertebral

- Trachea (10-15 cm long)
- Esophagus
- Left Recurrent Laryngeal N.
- Thoracic duct

(II)

Inferior Mediastinum \Rightarrow

Anterior

- Superior & Inferior sterno-pericardial Ligaments

Middle

- Heart c/pericardium;
- Bifurcation of Trachea;
- Ascending Aorta;
- R.t. & Lt. Pulmonary veins;
- Phrenic Nerve

Posterior

- Esophagus
- Thoracic duct
- Descending Thoracic Aorta
- Azygous vein
- Splanchnic Nerve from lower 8-10 thoracic ganglia
- Hemiazygous vein & Azygous vein

NUMBER

Distance from Incisor

Bony Level

1

15 cm (6 inch)

 C_6

2

22.5 cm (9 inch)

 T_4

3

27.5 cm (11 inch)

 T_6

4

37.5 cm - 40 cm (15-16 inch)

 T_{10}

* ESOPHAGEAL CONSTRICCTIONS

At H& beginning

(Pharyngo-esophageal junction)

crossing of Aortic Arch

crossing of Left Main Br

Piercing diaphragm (At L.F)

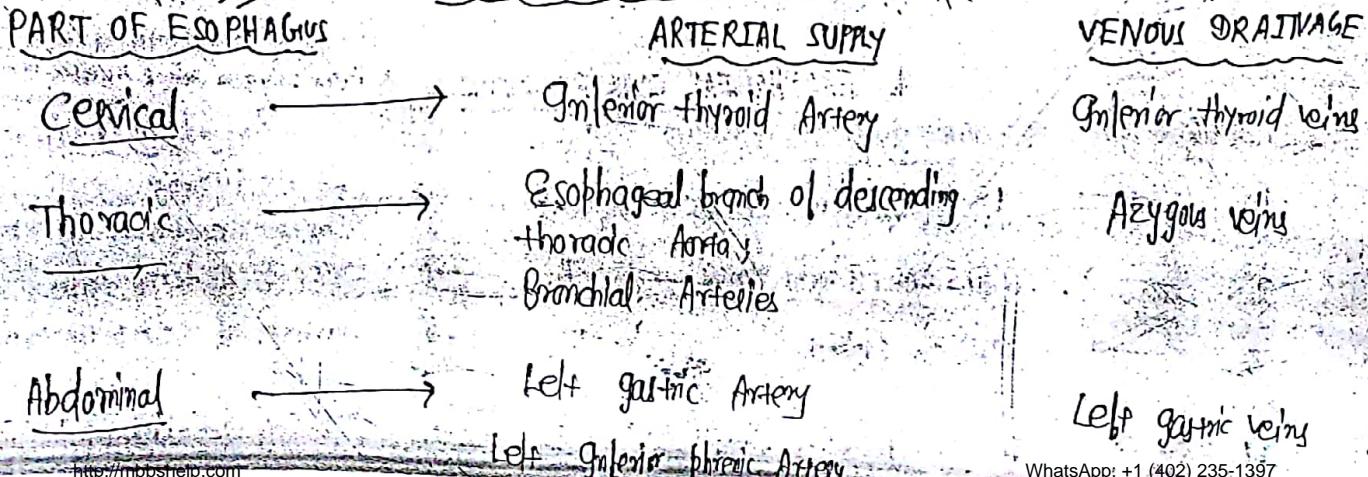
* INTER-ATRIAL SEPTUM

- Septum primum grows from the wall of the Atrium towards the A-V cushion.
- opening b/w them is Klæs → "Foramen Primum".
- Septum primum fuses w/ the A-V cushion & breaks off
↓
this opening is Klæs "Foramen Secundum".
- Another Septum starts to grow from wall of the Atrium
↓
Klæs "Septum secundum".
 - Lies Next to Septum primum.
 - opening b/w them is Klæs "Foramen ovale".
- Final closure of Foramen ovale occurs d/t fusion of Septum primum & Septum secundum.

ASD (Atrial Septal Defect)

1. Septum secundum type of ASD \rightarrow M/c ASD
 - Occurs d/t excessive Resorption of Septum primum or Underdevelopment or Reduced size of Septum secundum.
2. Septum primum type of ASD \rightarrow
 - Failure of Septum primum to fuse w/ endocardial cushion.
 - May be combined w/ defects of endocardial cushion.

NEET '16 * BLOOD SUPPLY OF ESOPHAGUS



ABDOMEN & PELVIS

87

DIAPHRAGM

Origin :

Sternal



Xiphoid process

Costal



Inner aspect of

Lower 6 Ribs

Vertebral



i) R.t. & Lt. crus ;

ii) Medial arcuate Ligament
(Thickening of Psoas fascia)

iii) Lateral arcuate Ligament
(Thickening of Ant. layer of thoraco-lumbar fascia)

Insertion ⇒

Central tendon

* AIIMS Nov 17

caudal opening @ the level of T₈ vertebral passes through the "central tendon of Diaphragm"

Openings of diaphragm ⇒

T₈



GVC & R.t. Phrenic Nerve

Part of diaphragm

Central tendon (AIIMS 1)

T₁₀



Esophagus & R.t. & Lt. vagus

Muscular portion derived from Right crus R.R.

T₁₂



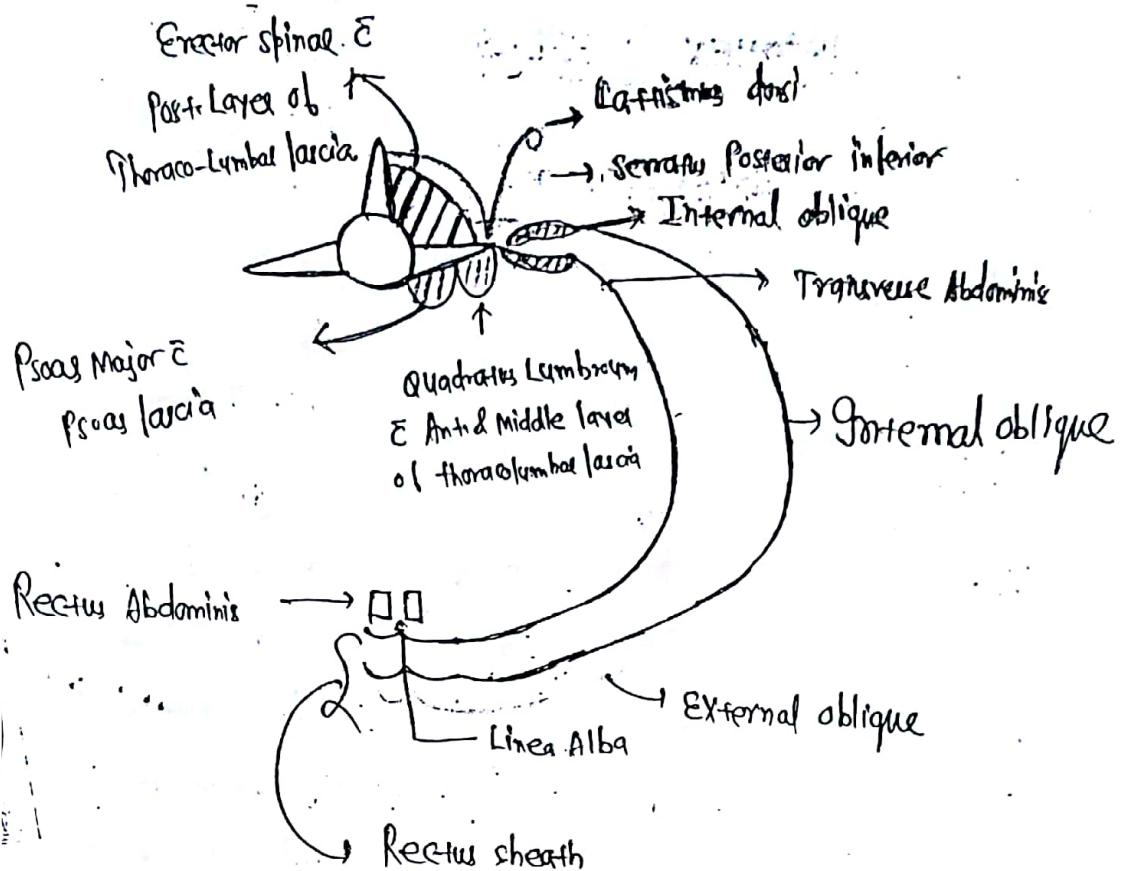
Aorta & Azygous vein & thoracic duct

B/w Right & Left crus
(Posterior to diaphragm)

* The sympathetic chain enters the Abdomen behind Medial Arcuate Ligament

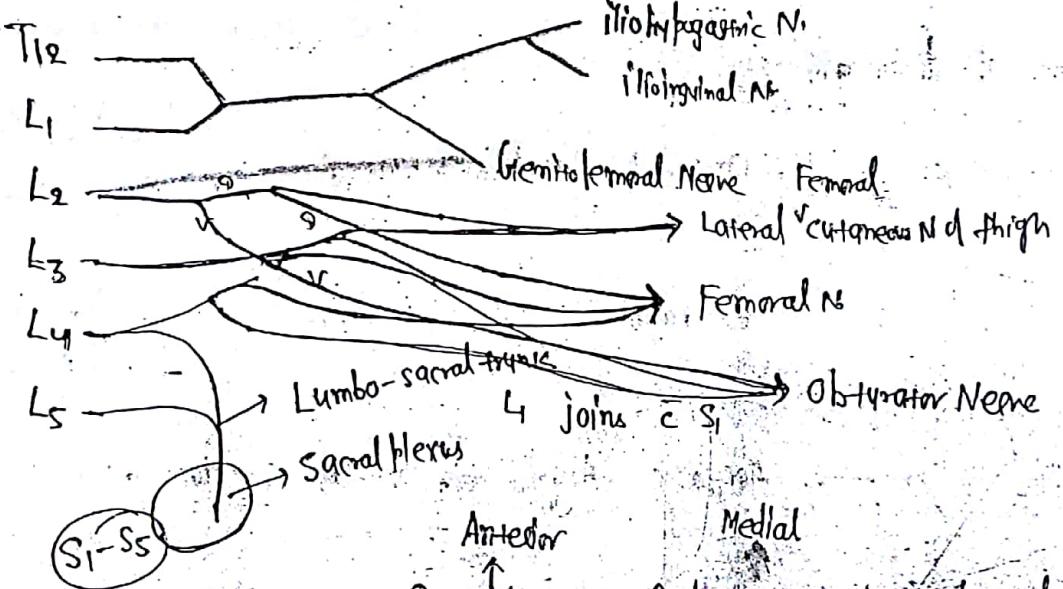
* The Subcostal Nerve & vessels enter behind — Lateral Arcuate Ligament.

* Foramen of Morgagni / space of Lorrey — A Small defect b/w sternal & costal origin v. of diaphragm, the superior epigastric vessels enter the abdomen through this gap.



Fig! Posterior Abdominal wall (cut section of Abdomen)

LUMBER PLEXUS → Formed from Anterior Rami of L₁-L₄; inside Psoas Major Muscle & also from T₁₂.



* All the Nerve except → Genitofemoral & obturator emerge lateral to Psoas Major.

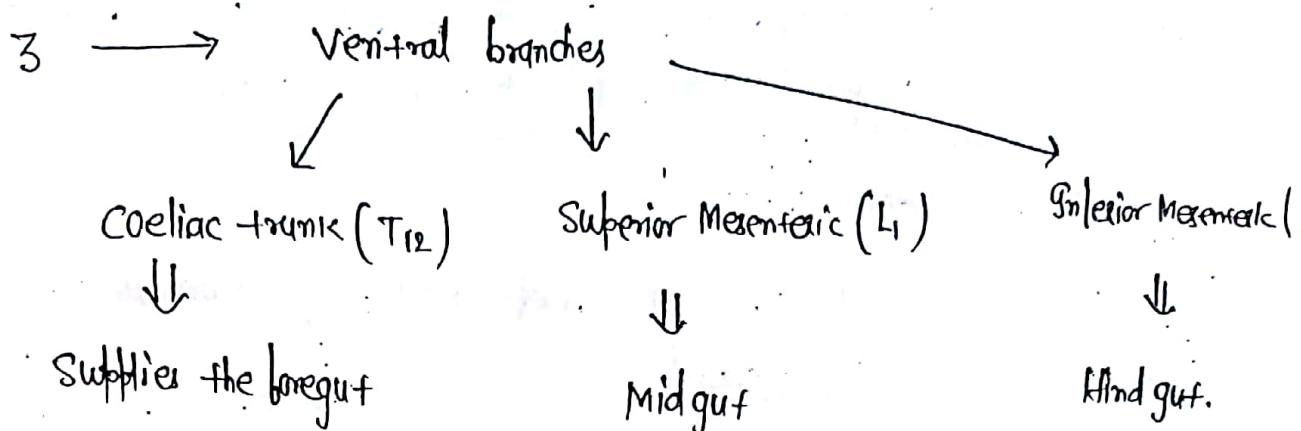
* Nervus lumbalis → L₄ (takes part in the formation of Lumbosacral plexus)

* Largest branch of Lumbar plexus → Femoral N.

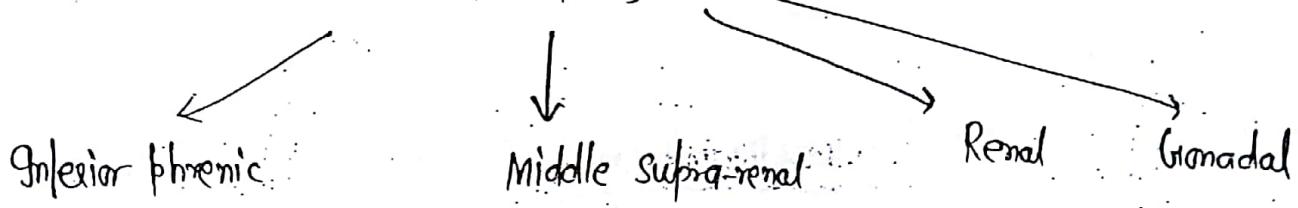
* lying in Ilio-Psoas groove → Genitofemoral N.

Abdominal Aorta & its branches (2,3,4,5)

2 → Terminal branches at L₄ — Common iliacs



4 → Lateral branches → all in Pairs



5 →

Dorsal branches

4 Pairs of Lumbar arteries

1 Median Sacral Artery.

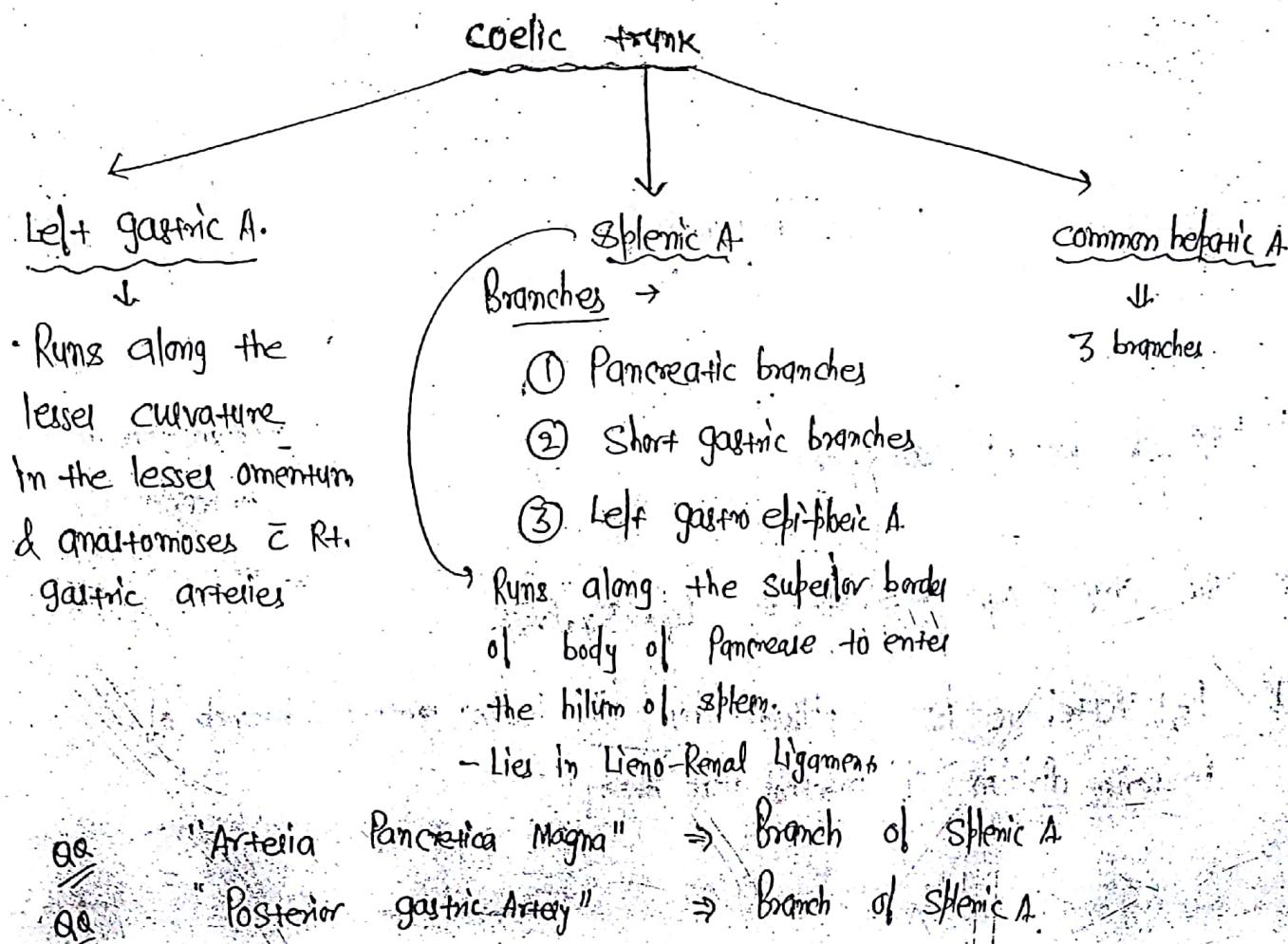
* Nut cracker sign's refer to ⇒ Left Renal vein.

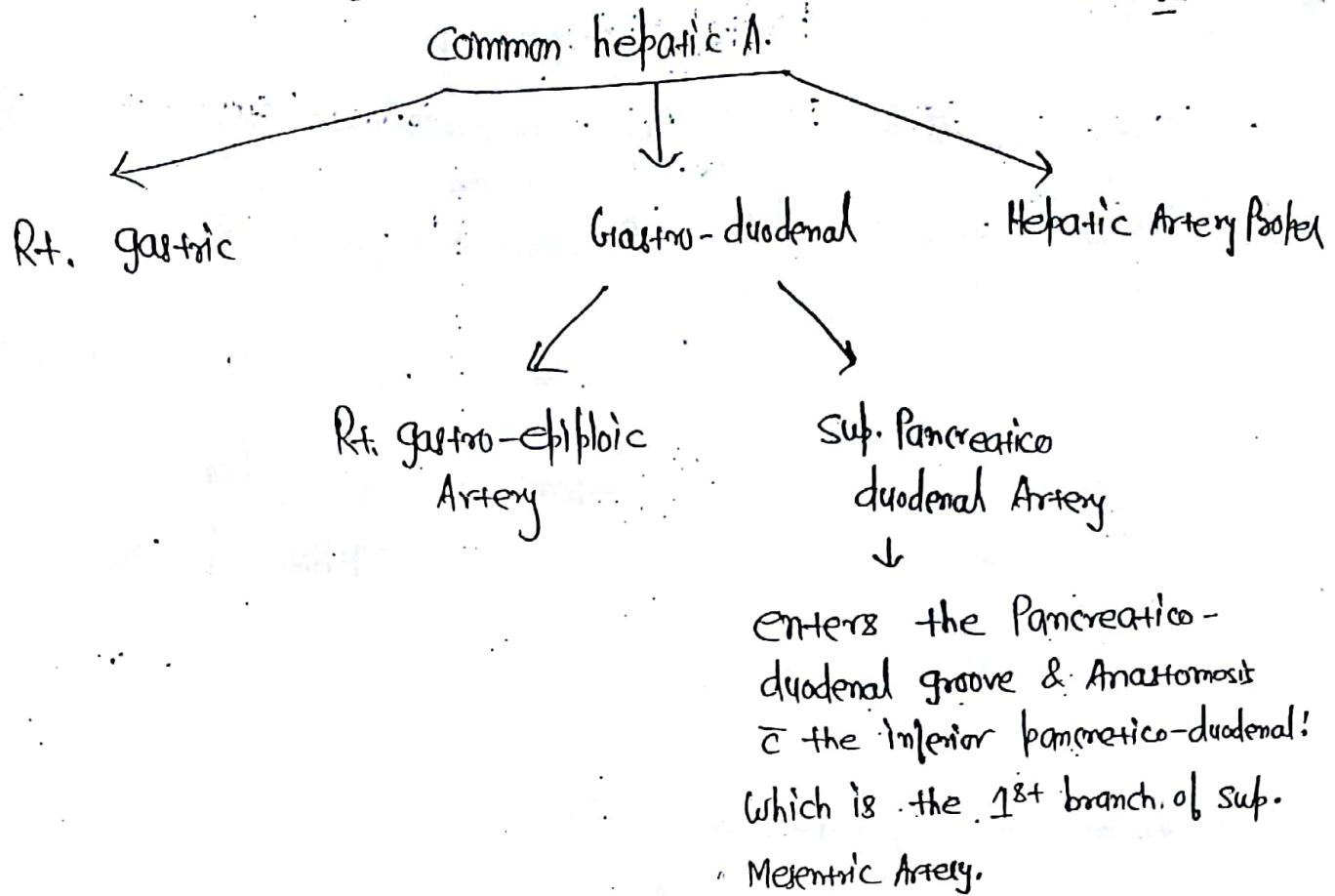
* L₅ Vertebrae is supplied by Ilio-lumbar artery ; branch of posterior division of Internal iliac Artery.

Foregut \Rightarrow Extends from Mouth to upper half of 2nd part of duodenum up to the opening of the bileduct
 - Also includes Liver; Pancreas & Spleen.

Midgut \Rightarrow extends from Lower half of 2nd part of duodenum to R.ti 2/3rd of transverse Colon.

Hindgut \Rightarrow extends from Left 1/3rd of transverse Colon to Anal canal.



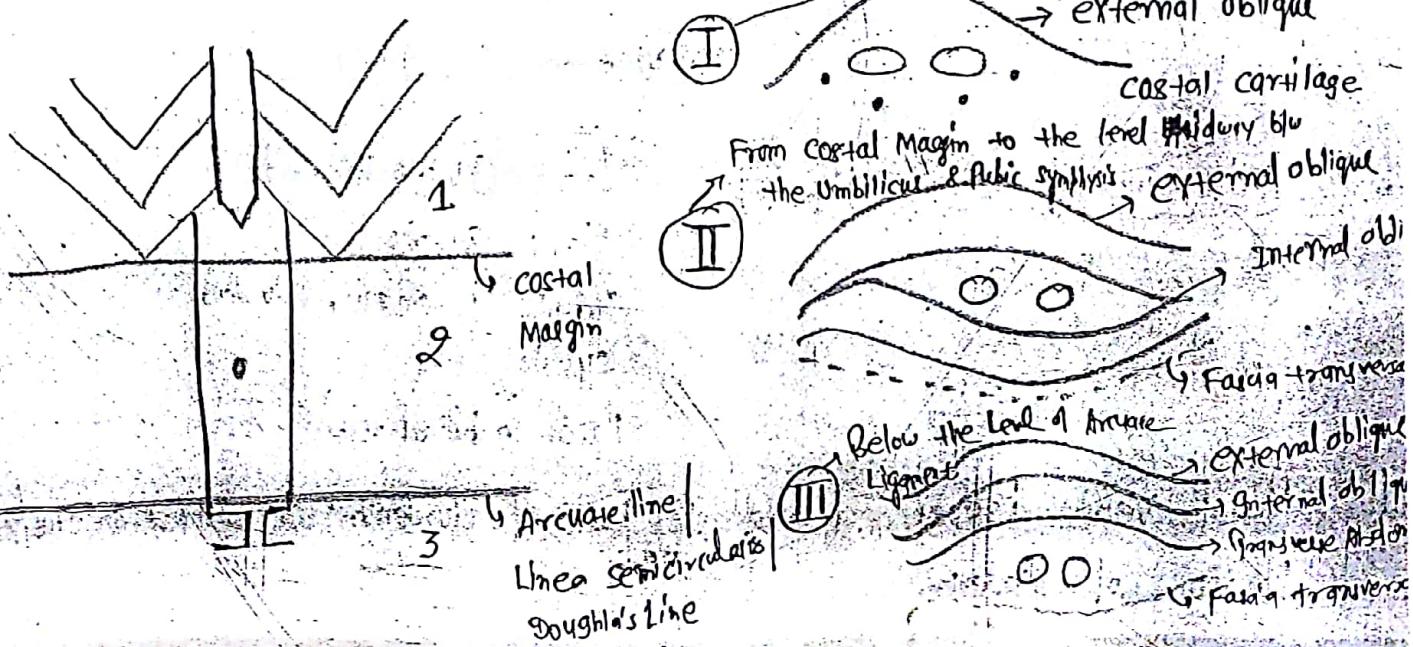


* Grillith's point (Junction of Right 2/3rd & Left 1/3rd of transverse colon)
watershed Line

⇒ Anastomosis b/w Superior Mesenteric Artery (Middle colic) & Inferior Mesenteric Artery (Left colic).

* Sudeck's point → (a) Recto-sigmoid junction; Anastomosis b/w Ileal Mesenteric artery (superior rectal) & Internal iliac (middle & int. Rectal Artery).

* RECTUS SHEATH Above the Level of Costal Margin



Portal vein

Length \Rightarrow 8 cm & Formed by Union of Superior Mesenteric vein & splenic vein behind the Neck of Pancreas.

i) Supra-duodenal part \Rightarrow Anterior & Right \Rightarrow Bile duct

Anterior & Left \Rightarrow Hepatic artery

Posterior \Rightarrow IVC separated by
Ostiole foramen,

ii) Retro-duodenal part \Rightarrow

Anterior & Right \Rightarrow Bile duct

Anterior & Left \Rightarrow Gastro-duodenal A.

Posterior \Rightarrow gvc

iii) Intra-duodenal part \Rightarrow

Anterior \Rightarrow Neck of the Pancreas

Posterior \Rightarrow gvc

* Tributaries of Portal vein \rightarrow

Left gastric vein;

Right gastric

Superior pancreatico-duodenal;
cystic

Pala-Umbilical veins

* Portal Vein passes behind 1st part of duodenum; so divided on the
Location of duodenum.

Bile duct \Rightarrow Formed by Union of cystic & common hepatic duct.

Length \Rightarrow 8cm \hookrightarrow Gall bladder \Rightarrow Lies on the Inferior Surface of Liver close related to segment IV or the quadrate lobe

i) Supra-duodenal part \Rightarrow Left \Rightarrow Hepatic Artery
Posterior \Rightarrow Portal vein

ii) Retro-duodenal part \Rightarrow Left \Rightarrow Gastroduodenal A.
Posterior \Rightarrow gvc

iii) Infra-duodenal part \Rightarrow Anterior \Rightarrow Head of the Pancreas.

Canal of Hering | Cntrahepatic bile ducts \Rightarrow Part of outflow system of excretory bile products from the Liver.

Superior Mesenteric Artery

Branches \Rightarrow Inferior Pancreatico-duodenal A.

Iejunal & Iliac branches

Middle colic

Rt. colic

Ilio. colic

Ascending branch

Descending branch

a) Ant. cecal

b) Post. cecal

c) Appendicular

d) Iliac - Supply last part of ilium,

Recurrent appendicular Artery

↳ Branch of Appendicular | Post. cecal artery

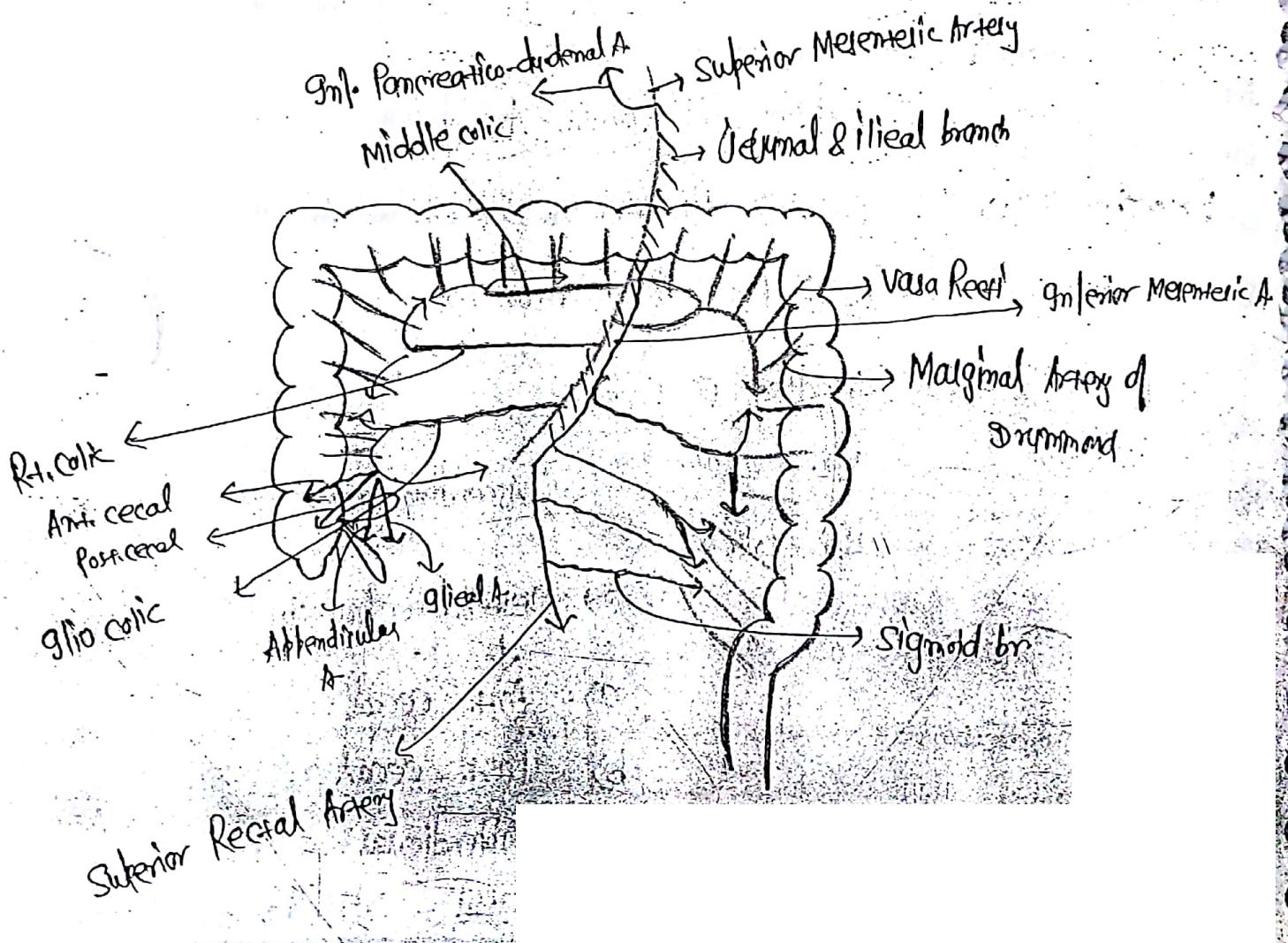
Accessory appendicular artery of SHESHA CALAM

↳ Branch of Post. cecal artery

* Inferior Mesenteric Artery

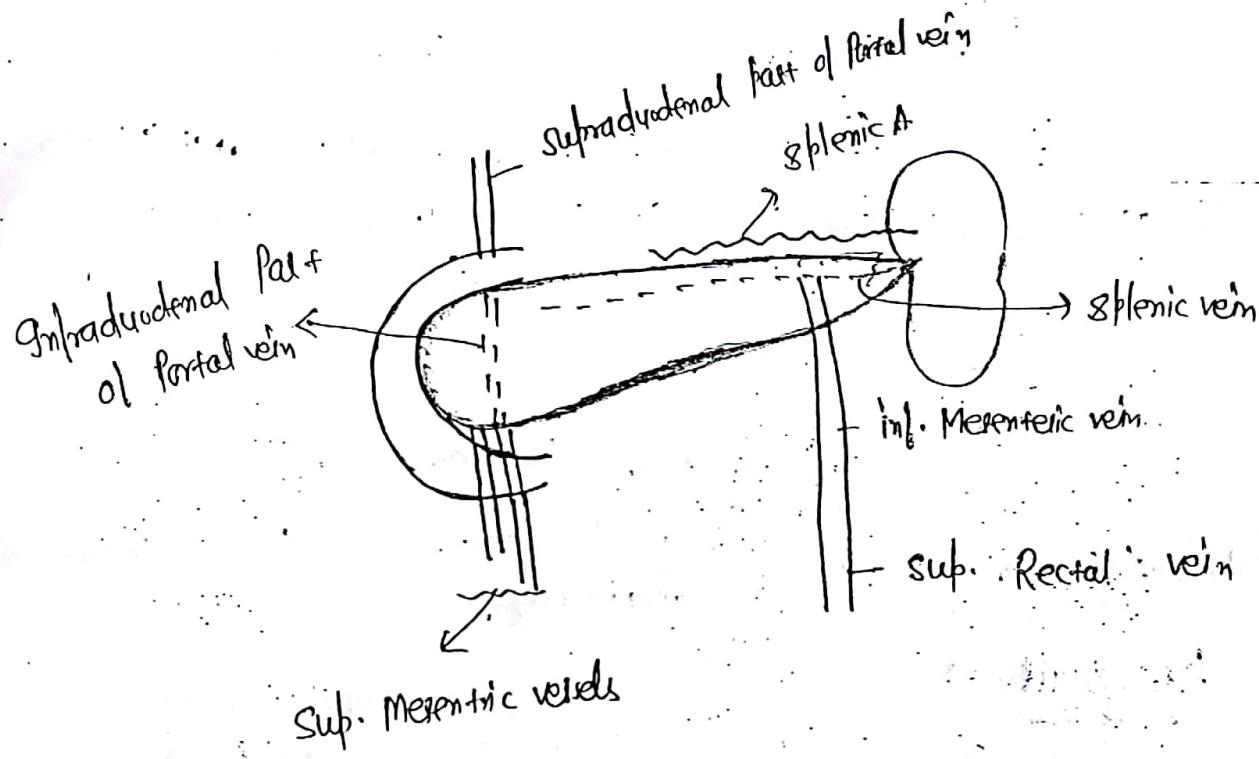
Branches

- Left colic
- Sigmoid branches
- Superior Rectal arteries (continuation of Inf. Mesenteric A.)



* Blood vessels Related to Pancreas ↗

- Along the Superior border of the body → Splenic Artery
- Behind the Body → Splenic vein
- On the Uncinate process → Sub. Mesenteric vessels
- Behind the Neck of Pancreas → Portal vein



Inferior Vena Cava

- Formed at L₅ by two common iliacs.
- Tributaries ⇒

Common Iliacs

R-f & L-f, Renal

R-f Suba renal

R-f, Gonadal

Hepatic veins

Inferior phrenic veins

3rd & 4th Lumbar veins

ANTERIOR ABDOMINAL WALL

Layers : ⇒

- i) Skin; → Superficial Fatty Layer (Fascia of camber or camper's fascia)
- ii) Superficial fascia; → Deep Membrane Layer (Fascia of Scarpa or Superficial to Deep Scarpa's fascia)
- iii) External oblique Muscle;
- iv) Internal oblique Muscle;
- v) Transversus Abdominis Muscle;
- vi) Fascia transversalis;
- vii) Extraperitoneal tissue;
- viii) Parietal Layer of Peritoneum.

* Deep fascia is absent in the Anterior Abdominal wall to allow the bulging of abdominal wall after meal, during pregnancy etc.

Inguinal canal (Length = 4-6 cm)

Boundaries ⇒ Extends from deep inguinal ring to superficial inguinal ring.

Ant. wall ⇒

In its entire extent → External oblique

In its lateral part → Internal oblique & transverse abdominis

Post. wall ⇒

In its entire extent → Fascia transversalis

In its Medial part ⇒ Conjoint tendon

Root ⇒

Conjoint tendon

Floor ⇒

External oblique & inguinal ligament.

AH 13

Superficial Inguinal Ring \Rightarrow defect in External oblique Aponeurosis,

* Deep Inguinal Ring \Rightarrow defect in Fascia transversalis,

* Conjoint tendon is formed by Fusion of Aponeurotic fibres of internal oblique & Transversus Abdominis.

Covering of testis

External Spermatik Fascia \rightarrow derived from External oblique Aponeurosis,

Cremastic Fascia \rightarrow derived from Cremaster / Internal oblique

Internal Spermatik Fascia \rightarrow derived from Fascia transversalis

Tunica vaginalis \rightarrow derived from Peritoneum (Mainly Parietal)

Tunica Albuginea \rightarrow covering of Connective tissue

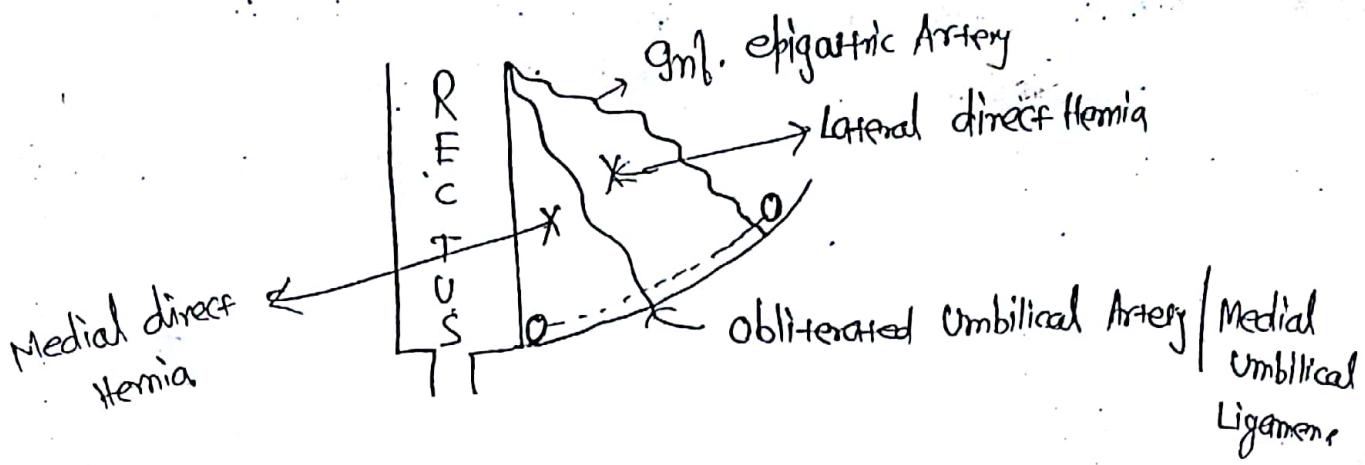
Tunica vasculosa \rightarrow covering of Blood vessels

CONTENTS OF SPERMATIC CORD

- Vas deferens (Ductus deferens)
- Artery to the vas (branch of Superior vesical Artery)
- Cremastic Artery — Branch of Inferior epigastric Artery
- Testicular Artery — Branch of Abdominal Aorta
- Pampiniform plexus of veins
- Genital br. of Genitofemoral Nerve
- Lymphatics from the testis
- Sympathetic Nerve fibres

Mnemonics \rightarrow Pills Don't contribute to

Good sex life



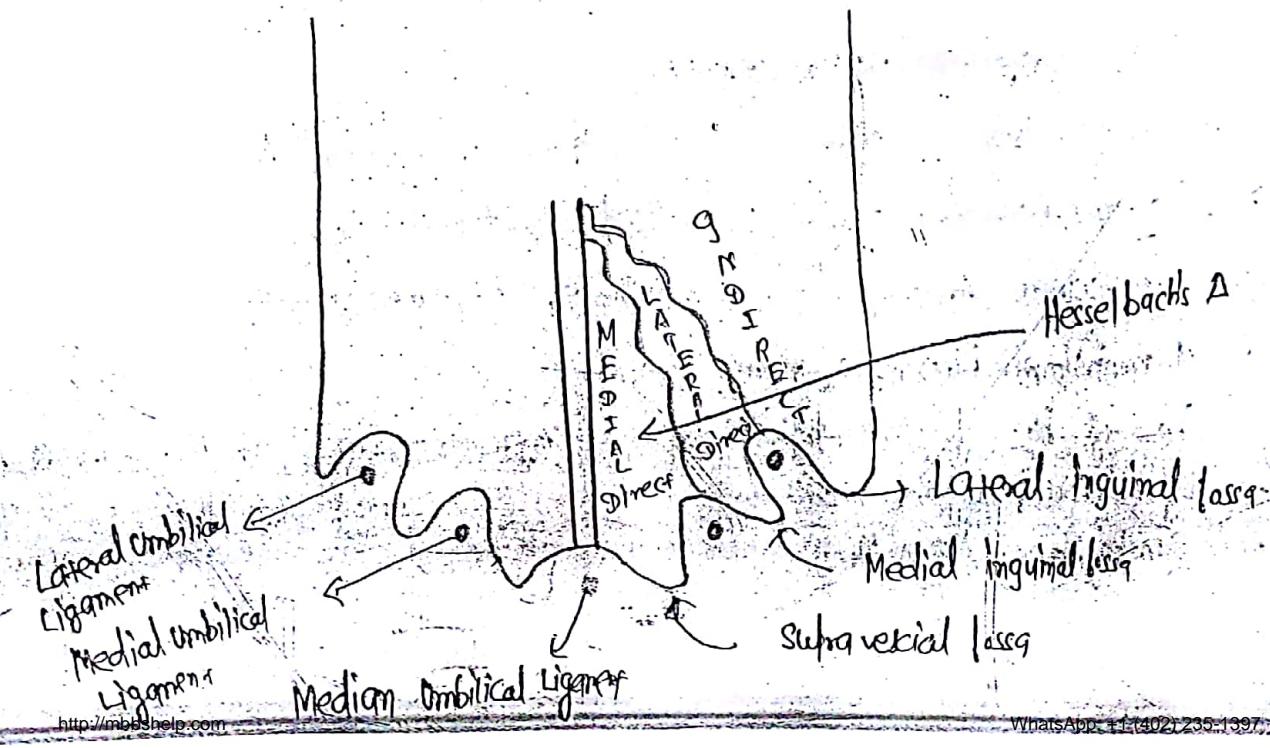
Medium Umbilical Ligament \Rightarrow Obliterated Urachus | Allantois

\Downarrow
if it doesn't obliterate

Wandering Umbilicus

Medial Umbilical Ligament \Rightarrow Obliterated Umbilical Artery

Lateral Umbilical Ligament \Rightarrow It is fold of Peritoneum ; which covers inferior epigastric vessels.



* Hesselbach's Δ → Medial Border → Lateral Margin of Rectus Sheath
(Linea Semilunaris);

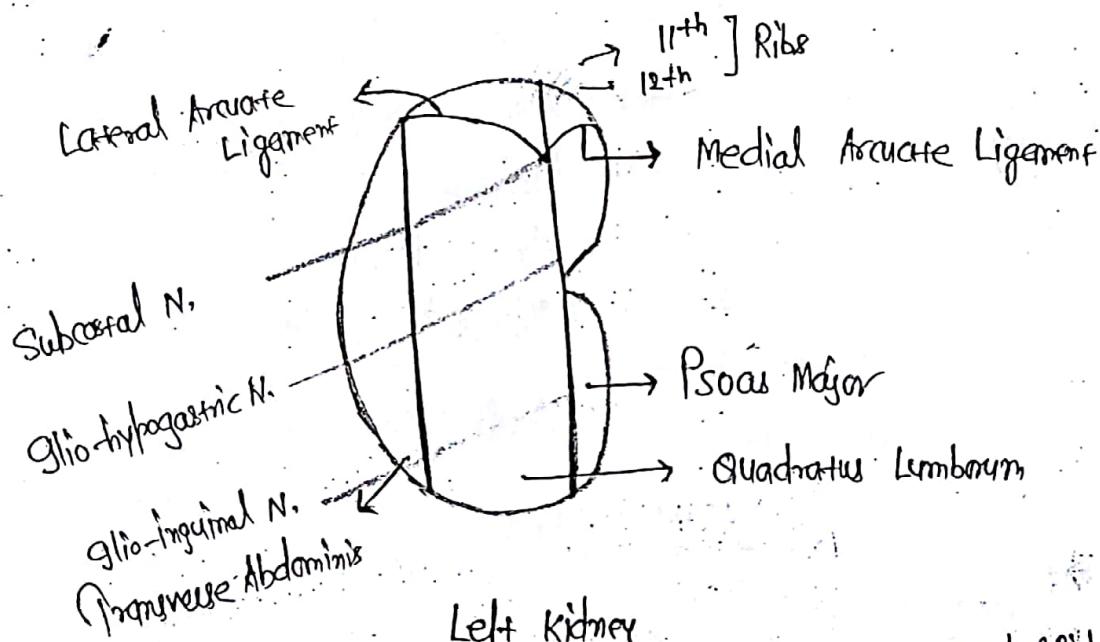
Superolateral Border → Inferior epigastric vessels.

Inferior Border → Gnimal Ligament (Poupart's Ligament).

KIDNEY

Posterior Relations of kidney

→ of both kidney all same except → Rt. kidney is Related to only 12th Rib; while left kidney related to both 11th & 12th Ribs.



Left Kidney

- * Venous drainage of kidney → Renal veins drains into IVC;
- Left Renal vein is longer & passes in front of Abdominal Aorta; behind origin of Superior Mesenteric Artery.
- Left Renal vein also receives Lt. Inferior phrenic vein, Lt. gonadal vein & Lt. Subrenal (Adrenal gland);
- Each renal vein begins beneath the true capsule or "Stellate vein".

* Anterior Relation of \Rightarrow (A) Right Kidney \Rightarrow

- Rt. Supra Renal gland
- Liver
- 2nd part of duodenum
- Ascending colon
- Hepatic flexure of the colon
- Small intestine

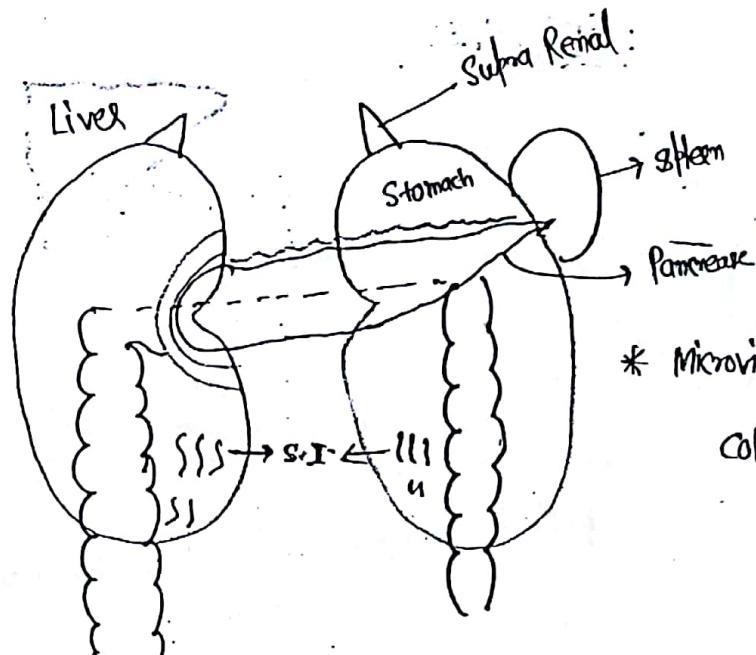
(B) Left kidney \Rightarrow

- Lt. Supra Renal gland
- Stomach
- Spleen
- Splenic Artery
- Pancreas
- Splenic Flexure
- Descending colon
- Small intestine

STOMACH BED

Formed by \Rightarrow

- Lt. Supra Renal
- Lt. kidney
- Spleen
- Splenic Artery
- Pancreas
- Transverse Colon
- Left lobe of diaphragm



* Microvilli are abt. In
↓
Collecting duct.

* Q&A (NEET 16)
DUCTS OF BELLINI ⇒ Papillary (collecting) ducts are Anatomical structures of kidney; k/a "DUCTS OF BELLINI".

* Q&A (NEET 16)
CAUDATE LOBE OF LIVER ⇒ Anatomically situated on Posterior surface of Right lobe.
- It belongs physiologically to both Right & Left lobes b/c it receives blood from Right & left hepatic arteries; Right & Left branches of Portal vein & drain bile into both Right & Left hepatic duct. Thus it is considered as "physiological independent lobe".
→ "Segment I"

* SPACE OF DISSE ⇒ k/a "Perisinusoidal space".

- Space b/w Hepatocytes & Hepatic Sinusoids.
- Exchange of substance b/w hepatocytes & blood takes place in the space of Disse.
- Microvilli of hepatocytes extend into this space; for surface area for absorption.
- Major constituents of space of Disse ⇒ Blood plasma

* RENAL VASCULATURE ⇒ Each kidney is supplied by Renal Artery (branch of abdominal Aorta) & drained by Renal vein to IVC;

• Rt. Renal Artery is longer & passes behind IVC;

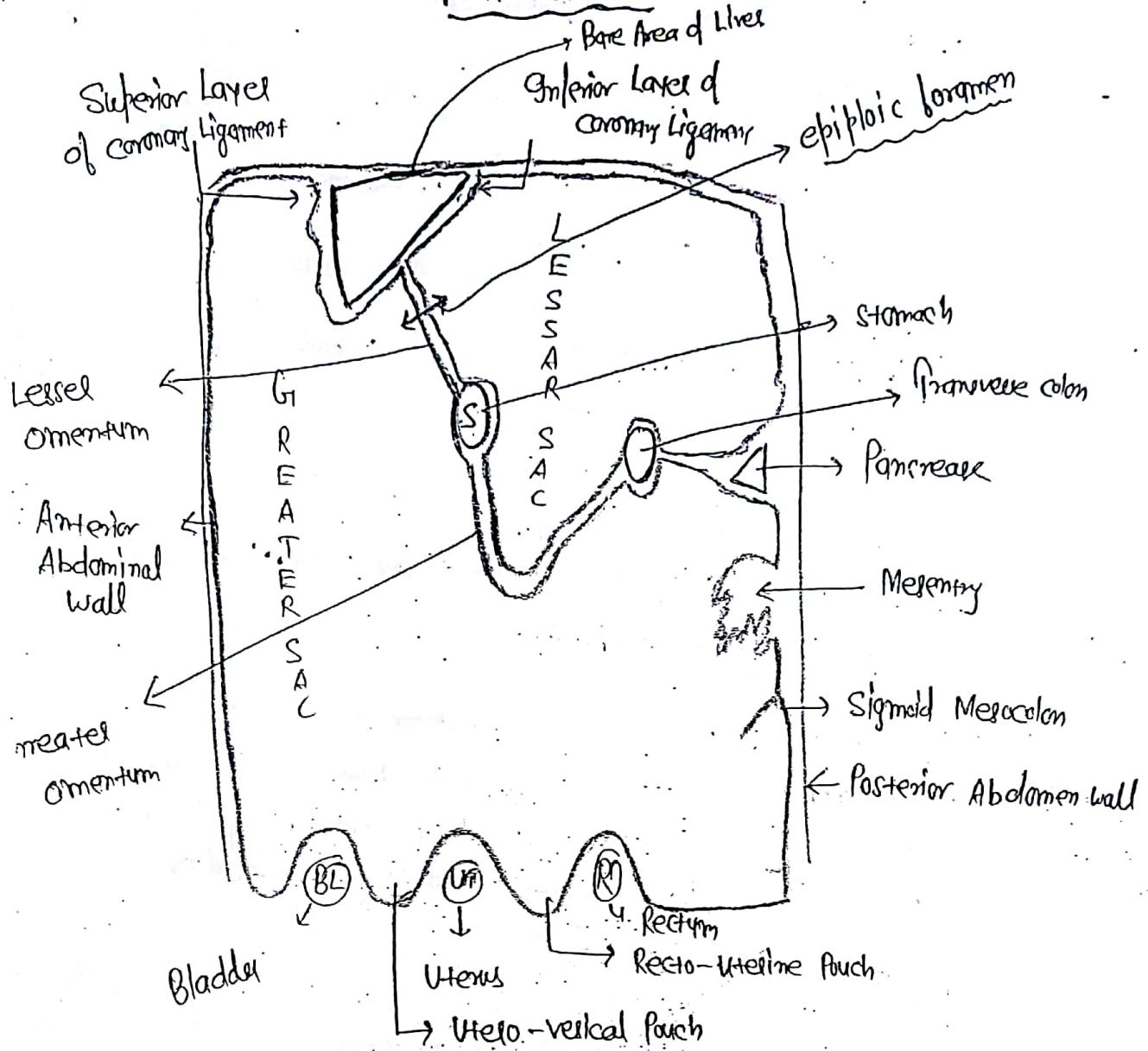
• Renal Artery divides into

→ (A) Posterior division ⇒ Supplies Posterior segm.

(B) Anterior division ⇒ 4 branches → Apical; Upper Anterior; Middle Anterior & Lower

• Branches of Renal artery are end arteries.

PERITONEUM



Retroperitoneal organs ⇒

- ① Kidneys
- ② Supra-Renal
- ③ duodenum except a small area of the 1st & 4th part,
- ④ Pancreas,
- ⑤ Ascending & Descending Colon
- ⑥ Aorta & vena cava
- ⑦ Ureters.

Set of tissue; which is formed by the double fold of Peritoneum, that attaches the Intestine to the wall of Abdomen.

Root of Mesentery \Rightarrow extends from I-J flexor (Left transverse proc of L₂) to Right Sacro-iliac joint. \rightarrow duodeno-jejunum flexor.

- ~~as~~ Structures crossing by the Root of Mesentery. \rightarrow

- 3rd Part of duodenum
- Aorta
- gvc
- Rt. Psoas Major
- Rt. Ureter.

\nearrow Kla "Foramen of Winslow" \Rightarrow Passage b/w greater sac & lesser sac

Epiploic foramen (Boundaries)

Anteriorly \Rightarrow Lesser Omentum containing hepatic artery; Portal & Bile duct.

Posteriorly \Rightarrow IVC

Rt. Suprarenal gland

Body of T₁₂ vertebrae

Superiorly \Rightarrow Caudate lobe of Liver (Caudate process)

Inferiorly \Rightarrow 1st part of duodenum

* Length of epiploic foramen \Rightarrow ~4-6 cm

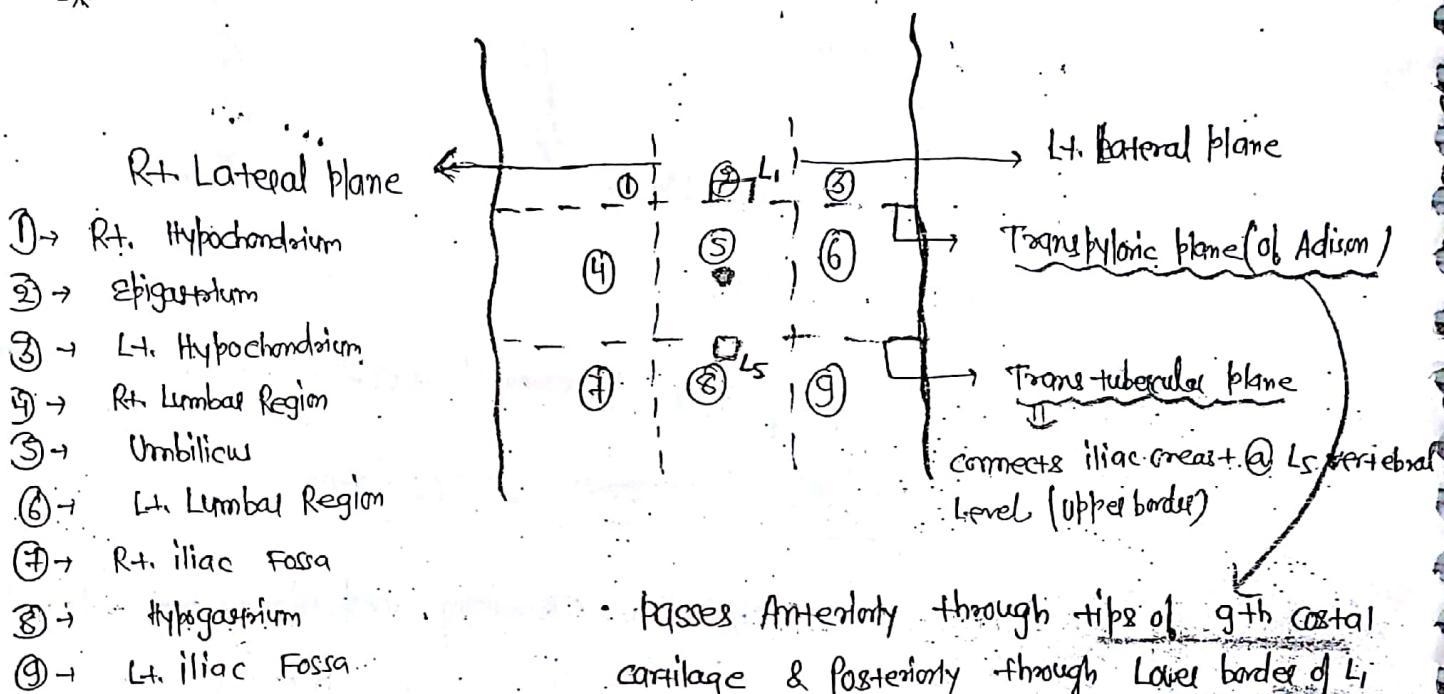
NEET'16

→ A Posterior gastric ulcer may perforate into the Lesser Sac (omental bursa). The leaking fluid passes out through epiploic foramen to reach hepatorenal pouch.



Sometimes, in these cases the epiploic foramen is closed by adhesion; so, the lesser sac become distended & can be drained by a tube passed through Lesser omentum.

*



- Passes anteriorly through tips of 9th costal cartilage & posteriorly through lower border of L1 vertebrae.
- Organs ⑦ & ⑧ this level ⇒ Hilum of kidney; Pylorus of stomach; Beginning of duodenum; Neck of Pancreas; Fundus of Gall bladder & origin of Superior Mesenteric vessels.

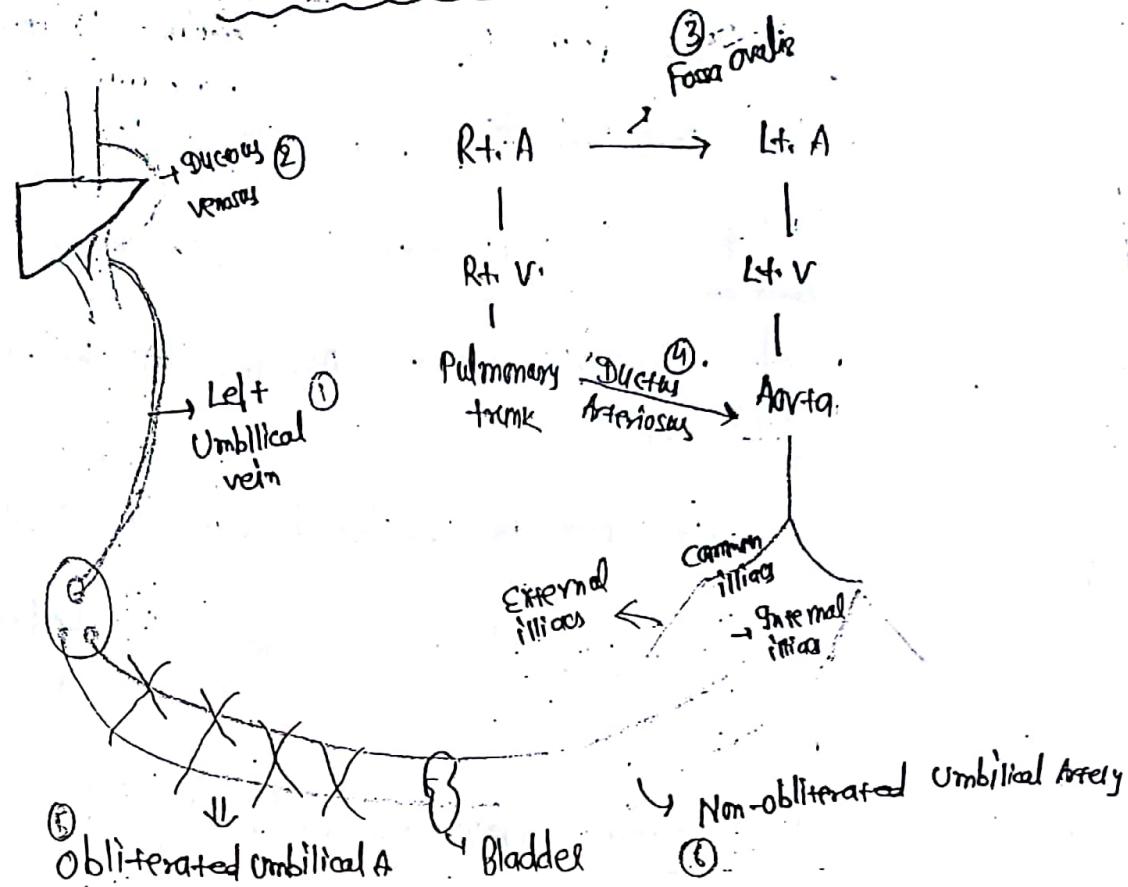
* Renal Angle ⇒ Angle b/w last rib & outer border of erector spinae.

* Umbilicus ⇒ Lies b/w L3 & L4 vertebrae.

~~SNR 11~~ Highest point of iliac crest lies @ L4 vertebrae. The supracostal plane is indicated by a horizontal line through the highest point of iliac crest.

* Umbilicus is watershed; Lymph flows upwards to drain into Axillary Lymph Nodes; Below the level of Umbilicus Lymph flows downwards to drain into Subfascial inguinal Lymph Node.

FETAL CIRCULATION



- * Uterine A. & ovarian A. together form Arcuate Artery Anastomosis; which the give off the Radial arteries & finally branches into basal & spiral Arteries

Uterine Artery → Arcuate artery → Radial Artery → Spiral Artery

- ① Obliterated Left Umbilical vein → Ligamentum teres
- ② Ductus venosus → Ligamentum venosum
- ③ Foramen ovale → Fossa ovalis
- ④ Ductus arteriosus → Ligamentum arteriosum
- ⑤ Obliterated Umbilical Artery | → Medical Umbilical Ligament
- ⑥ Non-obligated part of Umbilical Artery | → Superior vesical Artery
- Proximal part of Umbilical Artery

DEVELOPMENT OF STOMACH

- develops from Foregut
- At birth capacity = 30ml; Adults 1500-2000 ml
- Length = 10 inches
- Lt. has Rt. & Lt. Surface; Ant. & Post. borders

i) 1st Rotation Along vertical Axis \Rightarrow

Left Surface becomes Anterior & the Right becomes Posterior

- The Anterior border becomes \rightarrow Right
- Posterior border becomes \rightarrow Left

ii) 2nd Rotation Along Antero-posterior axis \Rightarrow

Pylorus comes to lie @ a higher level

- The left border grows rapidly to form greater Sac
- during Rotation the dorsal Mesogastrium also turns to the left; thus forming lesser Sac

* Derivatives of ventral Mesogastrium \Rightarrow

i) Falciform Ligament contains \rightarrow Ligamentum teres & Portal umbilical vein

ii) Lesser omentum

iii) Superior & Inferior Layers of coronary Ligament

iv) Rt & left triangular Ligaments

The Main Support of Liver is Hepatic vein draining into gvc

Derivatives of Dorsal Mesogastrum \Rightarrow

- i) Gastro-splenic Ligament \Rightarrow Contains short gastric vessels & Left gastroepiploic vessels
- ii) LimoRenal Ligament \Rightarrow contains splenic vessels & tail of the pancreas
- iii) Greater Omentum
- iv) gastro-phrenic Ligament.

Blood Supply of Stomach \Rightarrow

Along the Lessel curvature \rightarrow Lt. & Rt. gastric Arteries;
Along the Greatef curvature \rightarrow Lt. & Rt. gastro-epiploic arteries;
Fundus \rightarrow Short gastric Arteries

Venous drainage \Rightarrow

Lt. & Rt. gastric veins \rightarrow drains into the portal vein;
Lt. gastro-epiploic & short gastric veins \rightarrow drains into splenic vein;
Rt. gastro-epiploic vein \rightarrow drains into Superior Mesenteric vein,

NEET 16 \rightarrow The preblyotic vein of Mayo is a tributary of the Rt. gastric vein
is the external landmark of Gastroduodenal junction.

Development of Pancreas

Dorsal Pancreatic bud forms → Cephal part of head; Neck & tail of the Pancreas

Ventral Pancreatic bud forms → Lower part of head & Uncinate process

Annular Pancreas is diff. defective migration of Ventral Pancreatic bud.

Non-fusion of two buds Result in ⇒ Pancreatic division,
↓
Dorsal & ventral buds. M/c congenital Anomaly of Pancreas

Main Pancreatic duct / Duct of Wirsung ⇒

- derived from the duct of dorsal bud; ventral bud & the anastomosis b/w them.
- Opens @ Major duodenal papilla; 8 to 10 cm from the pylorus

Accessory Pancreatic duct / Duct of Santorini ⇒

- formed from duct of dorsal bud
- Opens @ Minor duodenal papilla; 6 to 8 cm from the pylorus

Accessory Pancreatic tissue May be found in ⇒

- (A) wall of stomach; duodenum; jejunum or ileum
- (B) Meckel's diverticulum.

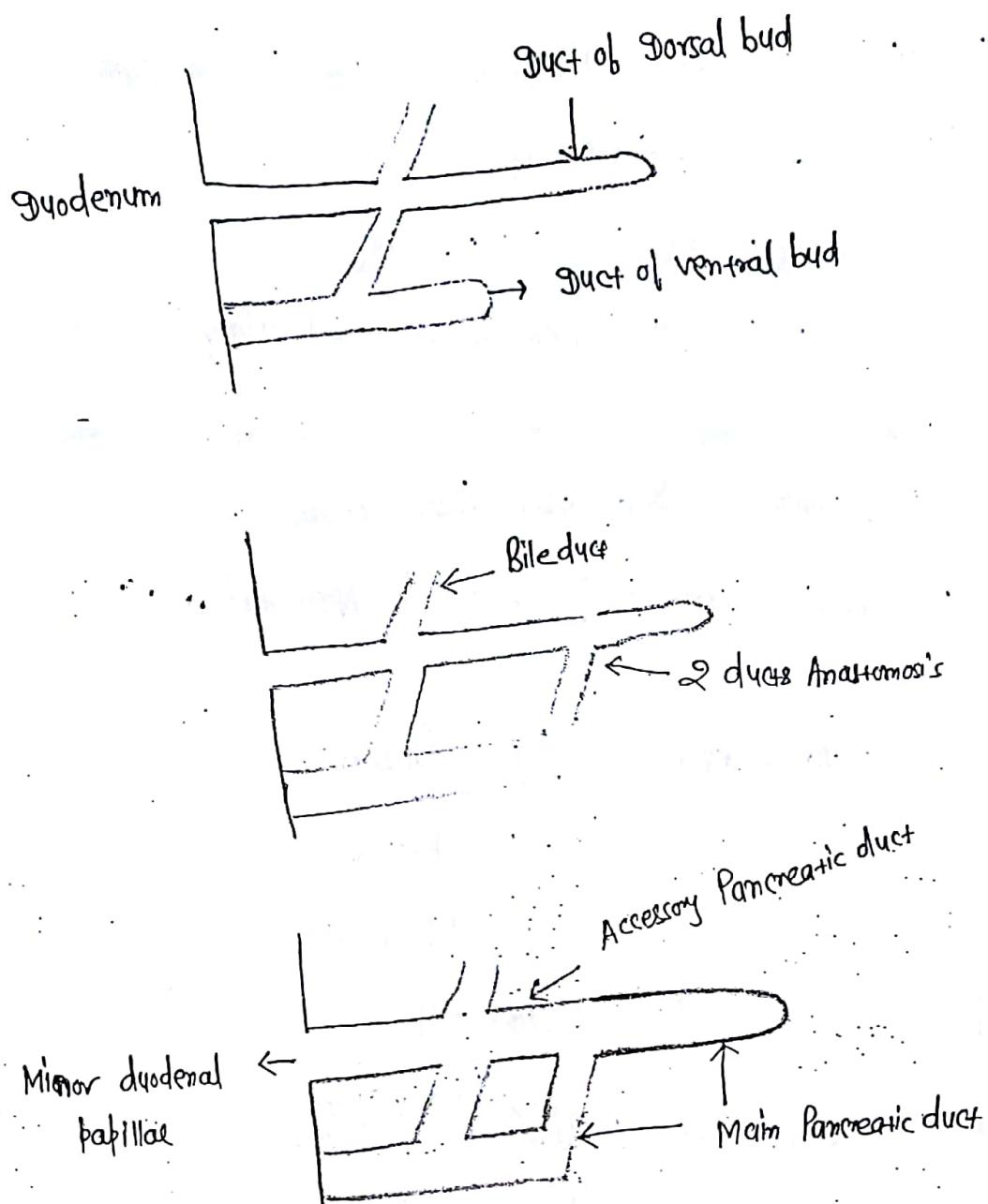


Fig: Development of Pancreatic duct

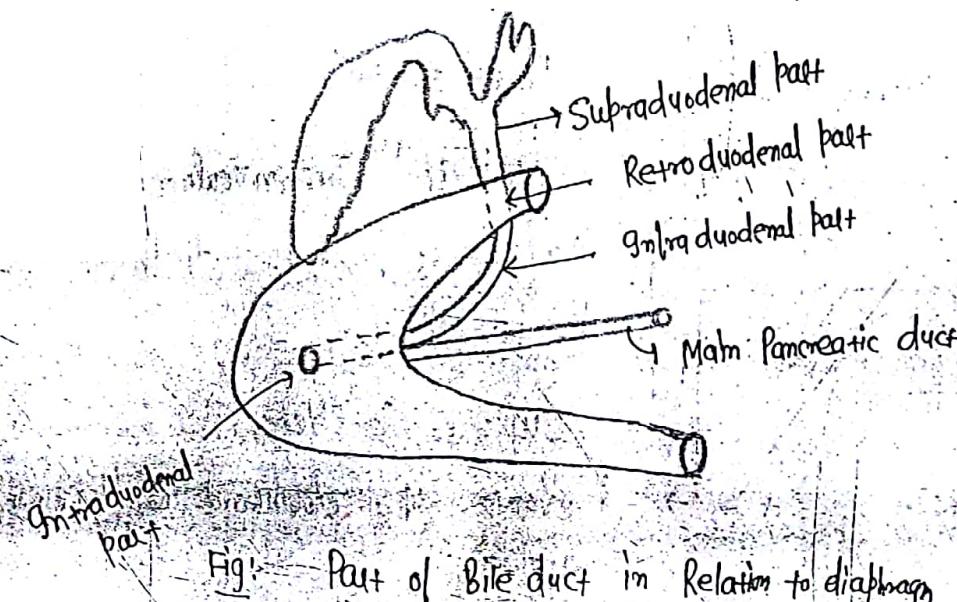


Fig: Part of Bile duct in Relation to diaphragm

SPLEEN (1, 3, 5, 7, 9, 11, 10)

- $1 \times 3 \times 5$ — dimension of spleen (in inches)
- 7 ounces of wt (250 gm)
- sit b/w the 9th & 11th Ribs
- Long axis of the spleen is directed along 10th Rib
- Spleen makes an angle of 45° \approx the H₂ plane
- It projects into the greater sac
- Superior border of spleen is Notched.

* Impression on spleen - a) Gastric

b) Renal

c) Pancreatic

d) Colic

e) Diaphragmatic

* Ligaments of spleen - a) Gastro-splenic

b) Lieno-Renal

c) Phrenico-colic

↳ Kru "Succentriculum Ligament".

↳ Extends from the diaphragm to splenic flexure of colon

↳ Supports the spleen

↳ Prevents the downward displacement of spleen.

Qd

Accessory spleen can be found in →

Hilum

Tail of Pancreas

Derivatives of dorsal Mesogastrium

Broad Ligament of Uterus

Spermatic cord

* PALS (Periaortic Lymphoid sheath) is a histological feature of \Rightarrow white pulp of the spleen

ROTATION OF GUT

- The pre-arterial segment lies — Superiorly

Post-arterial segment lies — Anteriorly

i) 1st Rotation (90°) \Rightarrow

the pre-arterial segment lies on R/t side

- it forms the Small intestine

- as it returns back to the Abdominal cavity, 2nd rotation occurs

ii) 2nd Rotation (90°) \Rightarrow

the post-arterial segment lies Superiorly

\rightarrow cecum lies in the midline

iii) 3rd Rotation $\rightarrow 90^\circ$

Cecum lies on R+ side - Subhepatic Cecum

- * Herniation of Midgut loop occurs by \Rightarrow 6 weeks
- * Herniation of Midgut loop Reduced by \Rightarrow 10 weeks

* MALROTATIONS \Rightarrow

1. Mixed Rotation \Rightarrow The pre-arterial segments alone rotates by 90° .

- The Post arterial segment rotates by 180°

QD cecum lies in the midline behind the stomach.

2. Non-Rotation \Rightarrow 180° Rotation is Normal

- Further Rotation doesn't occur

- cecum lies on Left side

- Left sided colon

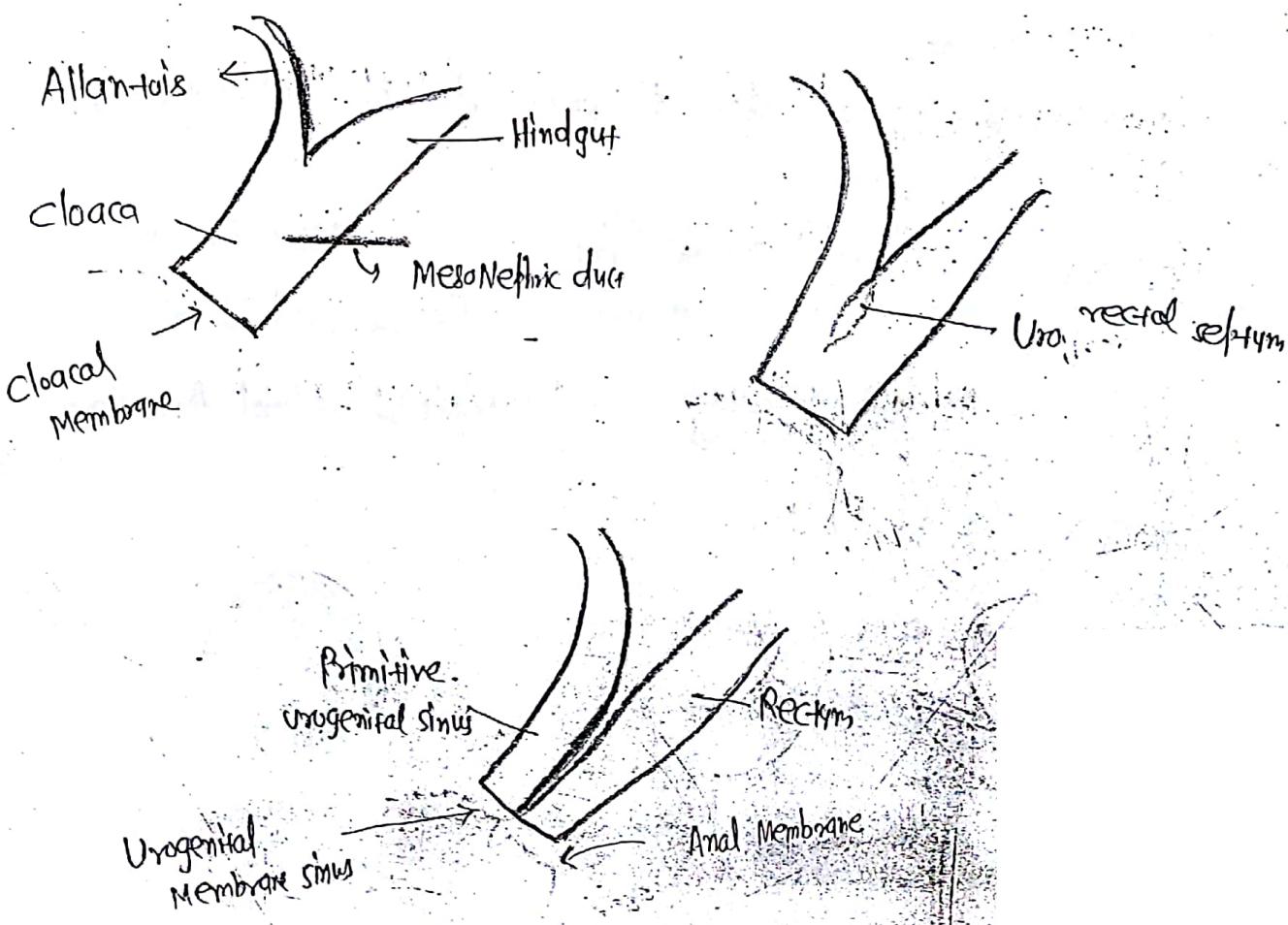
3. Reverse Rotation \Rightarrow 180° Rotation is Normal

- 2nd Rotation occurs by 180° in the Reverse direction

\rightarrow Transverse colon lies behind small intestine

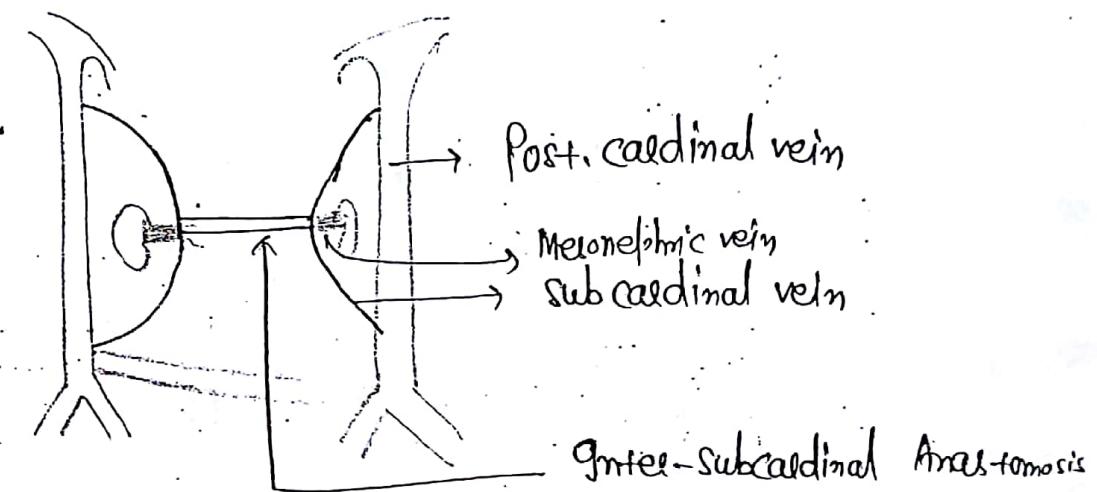
HIND-GUT (Urachus Fistula \Rightarrow Patent Allantois)

- Part of the hind-gut below the attachment of Allantois
↓
Cloaca
- The Uro-Rectal septum divides the cloaca into
 - Urogenital sinus Anteriorly
 - Rectum & Anal canal Posteriorly
- The cloacal Membrane divides into
 - Urogenital Membrane Anteriorly
 - Anal Membrane Posteriorly



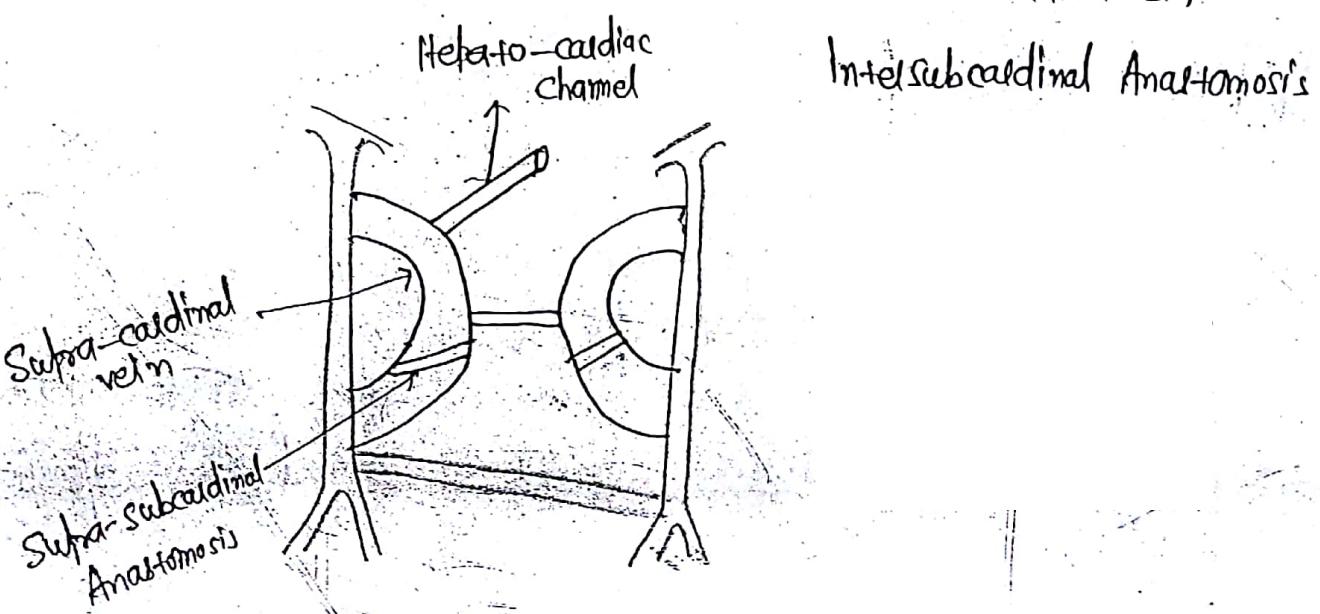
* Blood Supply of supra-Renal gland ! ↗

- ① Superior supra-Renal Artery → Branch of Inferior Phrenic Artery
- ② Middle supra-Renal Artery → Branch of Abdominal Aorta
- ③ Inferior supra-Renal Artery → Branch of Renal Artery



Rt. Renal vein → derived from Rt. Meso nephric vein

Lt. Renal vein → derived from - Lt. MesoNephric vein,
Lt. subcardinal vein,



* Clinical sign of different Porto - Systemic circulation \Rightarrow

esophageal varices (bleeding)

Hemorrhoids

caput Medusae

PORTAL HYPERTENSION

NEET'16

1. TEMPORARY MUCOSAL FOLDS \Rightarrow Mucosal fold; which are

Obliterated by distension.

e.g. Gastric Rugae of stomach & Longitudinal fold,

2. PERMANENT MUCOSAL FOLDS \Rightarrow e.g. plica circunflexa (valves of Kerckring) of Small Intestine;

• Crescentric Mucosal folds of cystic duct (spiral valve of Heister)

• Transverse (Horizontal) Rectal folds (Houston's valve or plica transversalis);

• Permanent Longitudinal Rectal columns or folds (Found in Lower Rectum Anal canal).

PETIT TRIANGLE (Anterior Lumbar triangle)

NEET'16

Boundaries \Rightarrow Base \Rightarrow Iliac crest.

Anterior Boundary (Abdominal Boundary) \Rightarrow Posterior border of External oblique Muscle

Posterior Boundary (Lumbar Boundary) \Rightarrow Anterior border of Lattissimus dorsi

Floor \Rightarrow Internal oblique Muscle



PELVIS

* Structures winding Around Sacral spine →

P → Pudendal Nerve

I → Internal Pudendal vessels

N → N. to Obturator Internus

they leave the pelvis through greater sciatic foramen and enter the perineum through lesser sciatic foramen.

- The tendon of obturator internus emerges out through lesser sciatic foramen.

* Blood supply of Pelvis : ⇒

- Internal Iliac Artery - Small terminal branch of common iliac A.

Anterior division

Posterior division

- Superior Vesical Artery

- Superior Gluteal Artery

- Inferior Vesical Artery
(Supplies the prostate)

- Lateral Sacral Artery

- Middle Rectal Artery

- Ilio-Lumbar Artery

- Obturator Artery

It supplies L5 vertebral

- Uterinal & Vaginal Artery

While Accessory (Aberrant) Obturator Artery is the branch of Anterior Epigastric Artery

- Superior Gluteal Artery

it is the branch of external iliac artery

- Internal Pudendal Artery

Anterior epigastric A.

In female it is replaced by Uterine & Vaginal Artery.

Femoral A.

Deep circumflex iliac A.

URETTER

- Length \Rightarrow 25 cm (10 inches)
- completely Retroperitoneal organ.

Abdominal Part -

Post. Relation \rightarrow Transverse process of Lumbar process,
Psoas Major

Genito-femoral Nerve

Ant. Relation of Right Uretel \rightarrow 3rd Part of duodenum

- Rt. colic vessels
- Ilio-colic vessels
- Root of Mesentery
- Gonadal vessels
- Terminal part of ileum

Ant. Relation of Left Uretel \rightarrow Left colic vessels

Sigmoid vessels

Sigmoid Mesocolon

Gonadal vessels

Pelvic part - goes backwards along greater Sciatic Notch ab
= internal iliac vessels behind it.

- turns anteriorly at ischial spine & enters the
Sublateral angle of trigone of bladder

In Males; the ureter is crossed by vas deferens

In Females; the ureter is crossed by Uterine ar

Blood Supply of Uretel \Rightarrow

- ① At its beginning \rightarrow Renal Artery;
- ② Below it \rightarrow Abdominal Aorta;
- ③ Little below it \rightarrow Gonadal Artery;
- ④ At the Pelvic inlet \rightarrow Internal Iliac / common iliac
- ⑤ Near the base of bladder \rightarrow
 - Superior vesical
 - Inferior vesicle
 - Middle Rectal

Constriction of Uretel \Rightarrow Diameter = 3mm

- ① Pelvi-Ureteric Junction
- ② Crossing of the pelvic brim / bifurcation of common iliacs / crossing of external iliac
- ③ Crossing by the ductus deferens / Broad Ligament
- ④ Entry into the bladder (Narrowest part of Uretel)
→ Known as "Verico-ureteric junction"
- ⑤ Opening into the Trigone

URINARY BLADDER

Retropubic space of Retzius:

Lies behind the Pubic symphysis

Contains vesicle venous plexus

- * except \rightarrow Trigone; Rest all are derived from "Verico-urethral canal" (endodermal)
- * 1st desire of Micturition usually appears at 150 - 250 ml filling

OVARY

- Suspended from posterior leaflet of broad Ligament by Mesovarium
- Attached to cornu of the uterus by Ligament of ovary and Lateral pelvic walls by suspensory Ligament of ovary / Infundibulo-pelvic Ligament.
- drains into the para-aortic lymph nodes.

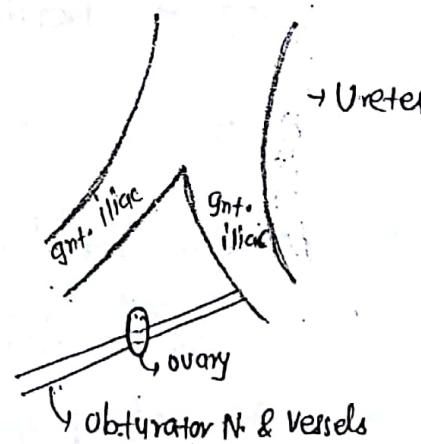
OVARIAN FOSSA

Boundaries →

Superiorly → external iliac vessels

Posteriorly → Uretel & internal iliac vessels

Laterally & the floor → obturator Nerve & vessels



UTERUS

Body ↓
 CERVIX (2.5 cm Long)

Round Ligament of Uterus is attached to → i) CORNU;
ii) Labia Majora

* Base of the bladder ↗

In Males →

- Separated from the Rectum in the upper part by Recto-
vesicle pouch
- Related to vas deferens, Ampulla of vas, seminal vesicle &
ejaculatory duct.

In Females - Related to supra-vaginal part of the cervix & vagina

Fascia of Denonvilliers → extends from Rectovesicle pouch to the
perineal body

↳ Separates the Rectum from seminal vesicle & prostate in
Males.

* N. Supply ↗ Sympathetic → $T_{10} - L_2$
↳ contracts the sphincter & relaxes the muscle

Parasympathetic ↗ $S_{2,3,4}$

↳ contracts the muscles & relaxes the sphincter

* epithelium of Bladder Mucosa ↗ Transitional

URETHRA

Male Urethra on Section → At bulb → Trapezium

In the Penis → Horizontal slit

At base of gland → Inverted "T" shape

At efferent urethral orifice → Vertical slit

Epithelial lining

→ Above the opening of ejaculatory duct → Transitional
Up to middle of gland → Columnar

Lymphatic drainage of Uterus \rightarrow

Fundus & Upper part \rightarrow Para-aortic Lymph Node

Middle Part \rightarrow External Iliac Lymph Node

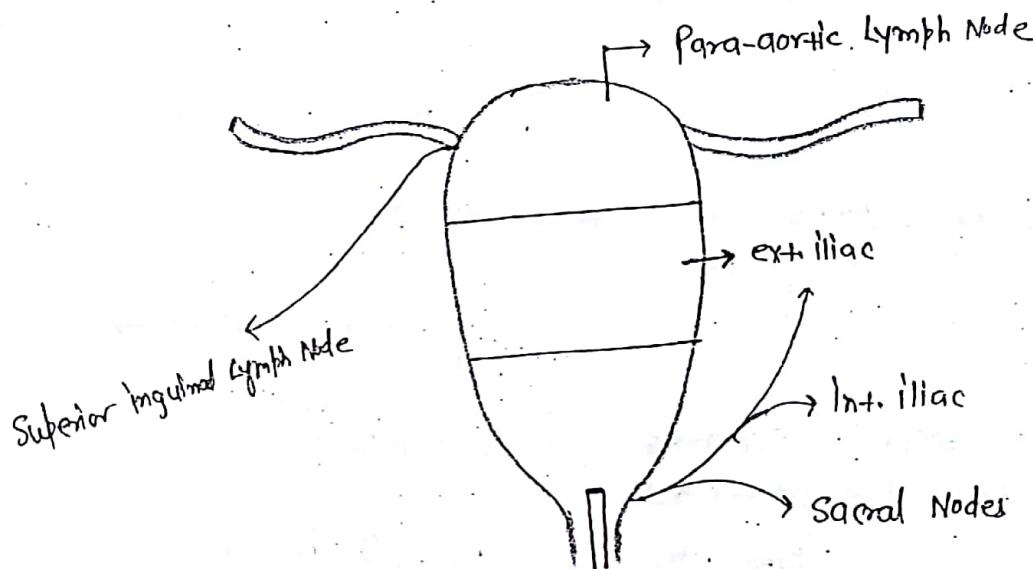
Lower Part \rightarrow In all direction

Anteriorly \Rightarrow External Iliac L.N.

Laterally \Rightarrow Internal Iliac L.N.

Posteriorly \Rightarrow Sacral L.N.

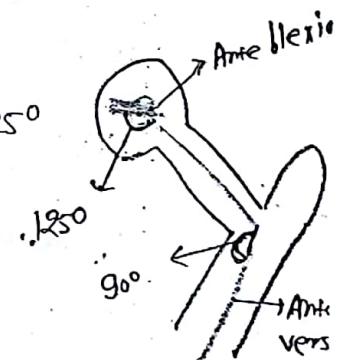
Cornu \rightarrow Subeclival Ingual Lymph Node



* Uterus \bar{c} vagina \Rightarrow 90° ; Uterus \bar{c} cervix \Rightarrow 125°

\downarrow
Anteversion

\downarrow
Anteflexion



* Uterine cavity \Rightarrow Lined by ciliated columnar epithelium;
cervical canal \Rightarrow Lined by Non-ciliated simple columnar epithelium;

* Nerve Supply \rightarrow Sympathetic \rightarrow From T₁₂; L₁ segments & carry Painful sensation from the body of Uterus.

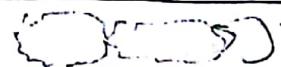
Parasympathetic \rightarrow From S_{2,3,4} & carry Painful sensation from cervix.

PROSTATE

FALSE CAPSULE

prostatic \rightarrow 

venous plexus



Prostate

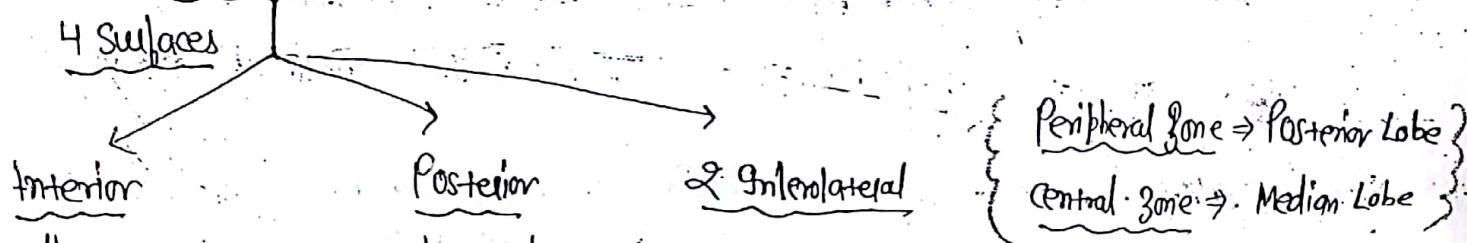
TRUE CAPSULE

 \leftarrow venous plexus (Thyroid)

Thyroid

- Prostatic venous plexus Communicates \rightarrow vesicle venous plexus
 \downarrow
 Dorsal vein of penis
- this further communicates \rightarrow vertebral venous plexus
 \downarrow
 Valveless communication
- ~~through it the prostatic carcinoma can spread to vertebral column & skull.~~
- Medial Lobe is More prone to hypertrophy (BPH)
- Posterior lobe is More prone to cancerous changes (Prostatic cancer)
- Anterior lobe \rightarrow devoid of glandular tissue hence Adenoma seldom occurs.

* Prostate \Rightarrow is also known "Fibro-Muscular-glandular organ".



\downarrow
 lies behind Pubic Symphysis;
 separated from it by extra-
 peritoneal fat in Retroperitoneal
 Space (cave of Retzius)

- Separated by
 Fascia of Denovilliers
 from Rectum

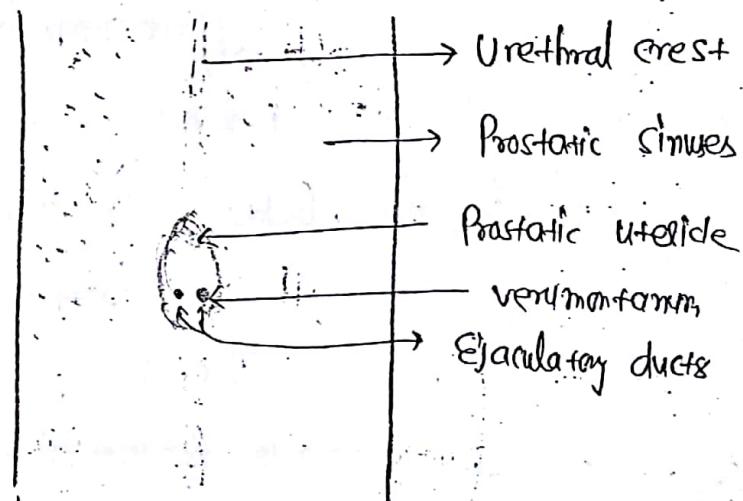
- Palpated on P.R. examination

PROSTATIC URETHRA

- Shows an elevation in Midline \Rightarrow Urethral crest
 ↓
 Form dist continuation of Trigonal Muscle
 the bladder.
- Another elevation in the middle of Urethral crest
 ↓

VERUMONTANUM / COLICULUS SEMINALIS

- Opening of Prostatic utricle in the centre and ejaculatory duct on the either side of verumontanum
- Opening of Prostatic gland / Prostatic Sinuses along Posterior surface



Fig! Prostatic Urethra \Rightarrow Ext + At the junction of Ant. 1/3rd
 Post. 2/3rd of gland.

* Corpora Amylocea (Amyloid bodies) \rightarrow Prostate

* Corpora Areacea \rightarrow Pineal gland

RECTUM

Length - 12 cm

Sacculations; Appendes epiploicae & Taenia coli are absent.

↳ Characteristics of Large intestine

* Horizontal folds / plica transversalis ↳

1st → Right wall → 12-14 cm Above Anal canal

2nd → Left wall → 7-5 cm Above Anus

3rd → (valve of Hauzen)

Anterior & Right wall → At the upper end of Rectal

Ampulla; Above Anus

* Development of Rectum ↳

Part of Rectum Above the hauzen valve

↓ developed from

Midgut

Part of Rectum below the hauzen valve

↓ developed from

Cloaca

* Waldeyer's fascia ⇒ connects Rectum to Sacrum.

* B. Supply of Rectum : ⇒ a) Superior Rectal Artery (Major supply) ⇒ continuation

of Inferior Mesenteric Artery.

b) Middle Rectal Artery ⇒ Branch of Anterior division of Internal Iliac Artery;

c) Median Sacral Artery

Branch of Aorta

drains into Inferior Mesenteric

* Venous drainage ⇒ a) Superior Rectal vein

vein

b) Middle Rectal vein → Drains into Internal iliac vein;

c) Median Sacral vein → Joins Left common iliac vein.

MALE

① Mesonephric \Rightarrow
 - Duct
 (Wolffian duct)

COMMON

(collecting tubules; Minor calyx; Major calyx;
 Pelvis, Ureter & Trigone of the bladder)

- Epididymis
- Vas - deferens
- Seminal vesicles
- Ejaculatory duct
- Mesoderm of Prostate

- Gartner's duct
 (Remnant)

② Paramesonephric \Rightarrow
 Duct
 (Mullerian duct)

Prostatic Utricle
 Appendix of Testis

- Fundus
- Body
- Cervix
- Upper 2/3rd of vagina
- Fallopian tubes

(Lower 1/3rd of vagina is derived
 from Sinovaginal bulbs formed
 from "Urogenital sinus")

↳ endodermal in origin.
 ↗ Klein "organ of Rosen"
 Ectophoron &
 Para-ophoron

③ Mesonephric
 tubules \Rightarrow

Paradidymis
 (Not functional)

④ Genital
 tubercle \Rightarrow

Penis

Clitoris

⑤ Genital
 swelling \Rightarrow

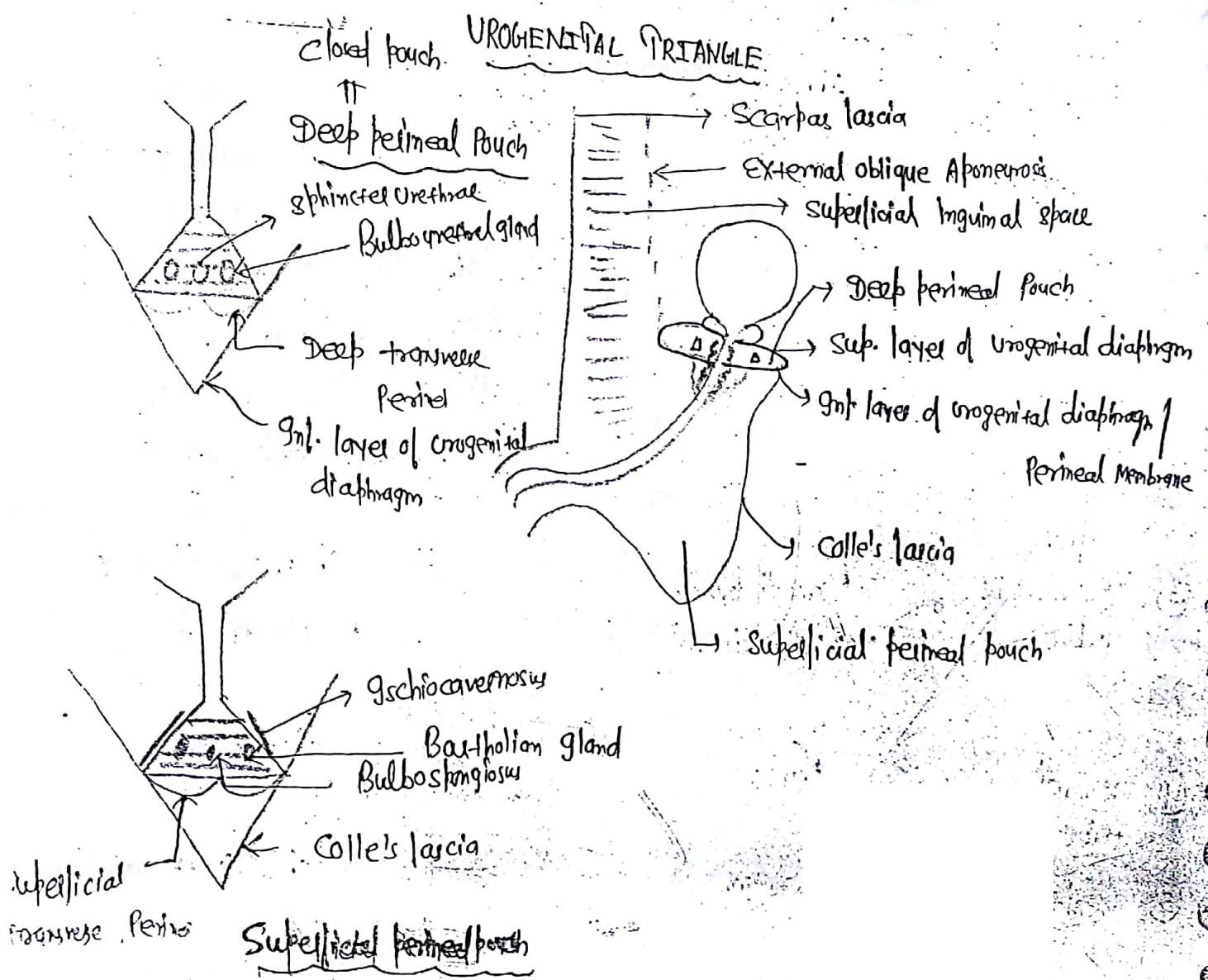
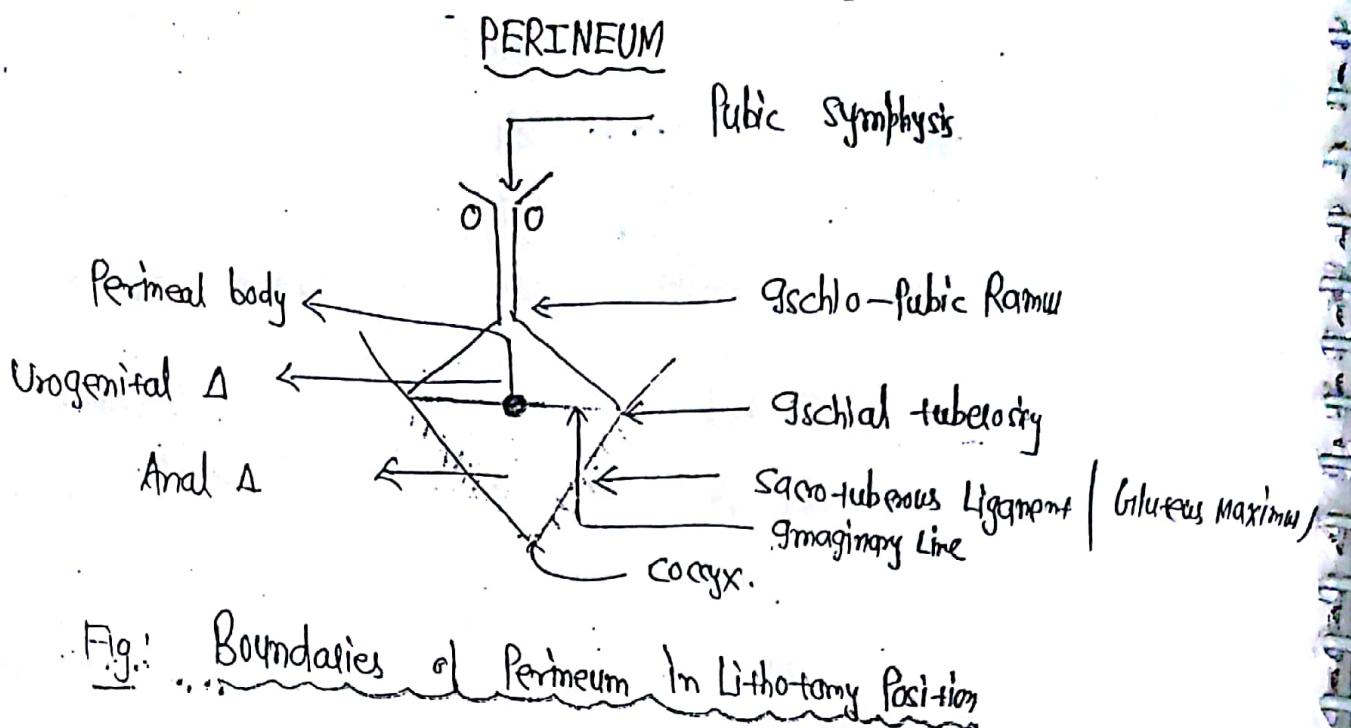
Scrotum

Labia Majora

⑥ Genital
 fold \Rightarrow

Ventral aspect of Penis

Labia Minora



Deep Perineal Pouch

Contents ⇒

- i) Sphincter Urethral Muscle } common in ♂/♀
- ii) Deep Transverse Perineal

In Males ⇒

- i) Bulbourethral gland | Cowper's gland
- ii) Dorsal Nerve of Penis;
- iii) Membranous Urethra

Superficial Perineal Pouch

Contents ⇒

- i) Ischio-cavernosus
- ii) Bulbo-spongiosus
- iii) Superficial Transverse Perinei

} common in ♂/♀

In Females ⇒ Bartholin glands | Greater Vestibular glands

In Males ⇒ Root of Penis (Bulb & corpus); Posterior scrotal Nerve; Urethra

* Chief Nerve of Perineum → Pudendal Nerve (Mixed Nerve)
↓ Arises from sacral plexus (S_2-S_3).

PERINEAL BODY ⇒ Ten Muscle converge →

- a) External Anal Sphincter;
- b) Fibres of Longitudinal Muscle coat of Anal canal;
- c) Bulbospongiosus;
- d) Superficial Transverse Perinei;
- e) Deep Transverse Perinei;
- f) Levator Ani

} Unpaired

} Paired

Holden's Line \Rightarrow A line drawn laterally from pubic tubercle;

↳ Urine doesn't cross this line diff from attachment of
Fascia latg along this line

- * Length of Prostatic urethra \Rightarrow 4cm (Most dilatable part of Male Urethra)
- Length of Membranous urethra \Rightarrow 1.5-2cm (Narrowest part of Urethra) NEET 16
- Length of Penile urethra \Rightarrow 15-20cm

Least dilatable part \Rightarrow External Urethral Meatus
Membranous urethra

Anal canal \Rightarrow Length \Rightarrow 38mm (3.8 cm)

IS
IS
8

Dentate / Pectinate Line \Rightarrow Represents the lower end of anal columns

White line of Hilton \Rightarrow Represents the Mucocutaneous junction of Anal canal

Extravasation of Urine / Rupture of Urethra In the Superficial perineal pouch

- \rightarrow Urine collects in the scrotum, penis & enters the superficial inguinal space;
- \rightarrow Urine doesn't cross the Holden's Line;

* ALCOCK'S CANAL \Rightarrow k/a "Pudendal canal"

\downarrow
It is fascial canal in the lateral wall of ischiorectal fossa; enclosing Pudendal Nerve & Internal Pudendal vessels (Artery & Vein);

\downarrow
It is space b/w obturator fascia & lunate fascia.

MESORECTUM (MESENTRY OF THE RECTUM) & ITS CONTENTS

- Superior Rectal Artery & its branches;
- Superior Rectal vein & Tributaries;
- Superior Rectal & Pararectal Nodes and Lymphatics along + Superior Rectal Artery;
- Branches from the anterior Mesenteric plexus descend to innervate the Rectum.

SOME EXTRA EDGE

→ Gubernaculum in Male forms \Rightarrow Gubernaculum Testis;
In Female forms \Rightarrow Ligament of ovary;
Round Ligament of uterus.

* Differentiation of Genital Ridge; into Lineage of Female or Male gonads i.e. ovary or Testis occurs @ 6-10 weeks. By 12 weeks this differentiation has occurred in all fetus.

* Prostate Analog in ♀ \Rightarrow Skene gland (Perurethral gland);

* Uterus & vagina Analog in ♂ \Rightarrow Prostatic Utricle

* Lower 1/3rd of vagina derived from \Rightarrow Urogenital Sinus.

* Upper 1/3rd of Rectum \Rightarrow covered by Peritoneum on the front &

* Middle 1/3rd of Rectum \Rightarrow covered by Peritoneum on the sides only.

* Lower 1/3rd of Rectum \Rightarrow devoid of Peritoneal Attachment.

OSSICO-RECTAL FOSSA

Boundaries -

- Anteriorly - Imaginary line joining two Ischial tuberosities.
- Posteriorly - Sacrotuberous Ligaments & Coccyx
- Laterally - Ischial tuberosity & obturator internus
- Medially - Anal canal
- Roof - Levator Ani
- Floor - Perineal skin

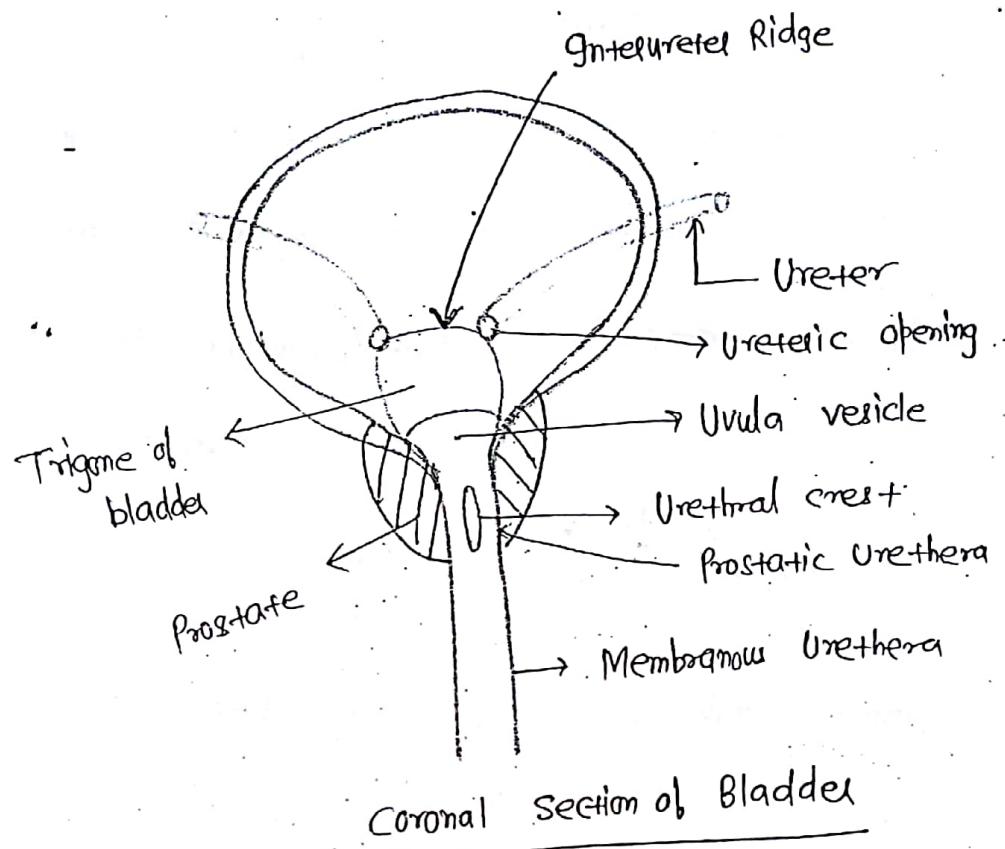
Contents

- ① Pudendal Nerve & vessels
- ② Inferior Rectal Nerve & vessels

TRIGONE OF BLADDER

- Lined by "Transitional epithelium"
- Mucosa is smooth & firmly Adherent;
- Ureters opens at lateral Angle of base & internal urethral orifice
Lies at Apex;
- Has Trigonal Muscle of bell (Smooth Muscle Layer just beneath Mucosa)
Derived from Absorbed part of Mesonephric duct (Wolffian duct)
- In the Region of Trigone, Muscular coat (Detrusor Muscle) is Separated from Trigonal Muscle of Bell by "Fascia of Waldeyer" Q.Q
 - Layer of Smooth Muscle just beneath the Mucosa of Trigone.
 - It Replaces "Submucous coat in Trigone Area".

- * Interureter Ridge \Rightarrow Klais "Mercier's bar"
 \rightarrow Length \rightarrow 2.5cm; when empty &
 5cm; when full
- * Micturition centre \Rightarrow cerebral cortex \rightarrow Medial frontal cortex
 Brain stem \rightarrow Pons (Bomington's cortex).



- * LAYER OF SCROTUM \Rightarrow Skin;
- ii) Dartos Muscle (Smooth Muscle Layer) \Rightarrow Continues \bar{c} Colles Fascia of Perineum posteriorly and Scrotal's fascia & camper's fascia anteriorly.
- iii) The external spermatic Fascia \Rightarrow Extension from External oblique.
- iv) The cremasteric Muscle \Rightarrow Continues \bar{c} fascia from Internal oblique.
- v) The internal spermatic Fascia \Rightarrow continues \bar{c} fascia from Fascia transversalis.

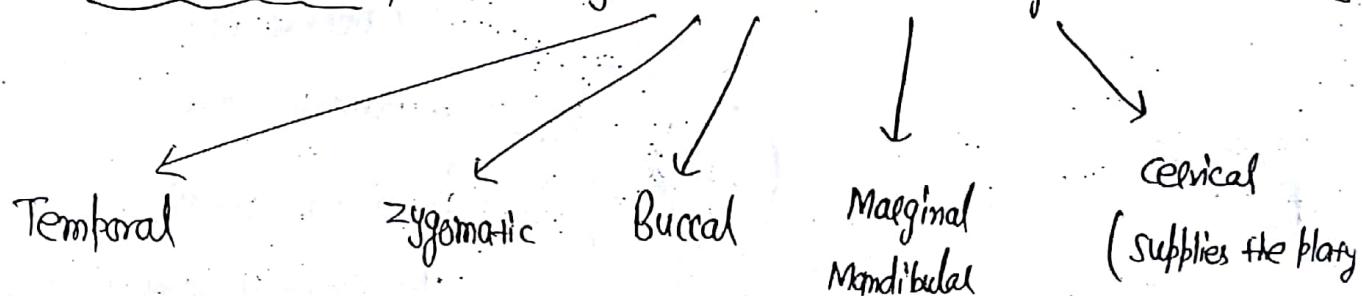
HEAD, FACE, NECK

NERVES OF THE PHARYNGEAL ARCH

1 st	Pharyngeal Arch	⇒	Mandibular
2 nd	Pharyngeal Arch	⇒	Facial
3 rd	Pharyngeal Arch	⇒	Glossopharyngeal
4 th	Pharyngeal Arch	⇒	Superior Laryngeal
... 6 th	Pharyngeal Arch	⇒	Recurrent Laryngeal
(5 th Arch ⇒ Disappears)			

→ each half of the face is supplied by 14 Nerves;
FACE 1 Motor & 13 sensory.

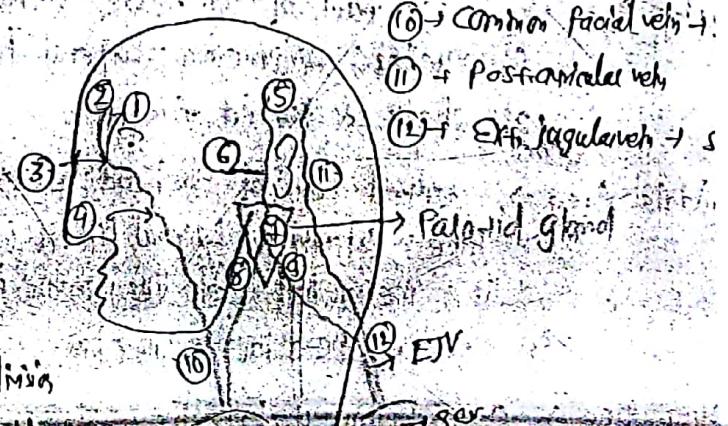
Motor Nerve supply \Rightarrow By Facial Nerve through its 5 branches



→ Facial N. Supplies all facial Muscles except \Rightarrow Levator palpebrae superioris
By 3rd CN

Venous drainage of Face \Rightarrow

- (1) → Subra-orbital vein
- (2) → Subra-tracheal vein
- (3) → Angular vein
- (4) → Facial vein
- (5) → Superficial temporal vein
- (6) → Maxillary vein
- (7) → Retro Mandibular vein



DANGEROUS AREA OF FACE

- Upper lip & in lower part of Nose

↓
Infection from Dangerous Area

Facial vein

Angulo facial vein

Deep Facial vein

Superior ophthalmic vein

Pterygoid venous plexus

Cavernous sinus

Emissary vein

Cavernous sinus

Cavernous sinus

Emissary vein

Pterygoid venous plexus

NEET'16

* Lymphatic drainage of Face \Rightarrow I. Upper Area \rightarrow By Pre-Auricular Parotid Nodes / Submandibular Parotid Nodes

Upper Area \Rightarrow Gated part of forehead; Lateral half of eyelids; conjunctiva; lateral part of cheek & parotid area.

II. Middle Area \rightarrow By Sub Mandibular Nodes

Middle Area \Rightarrow Central part of forehead; External nose; upper lip; Lateral part of lower lip; Medial half of eye-lids; Medial part of cheek & greater part of lower jaw.

III. Lower Area \rightarrow By Sub-Mental Nodes

Lower Area \Rightarrow central part of lower lip & chin.

* Sensory Nerve supply of the Face \Rightarrow

is by Trigeminal Nerve through its three division \Rightarrow

Ophthalmic

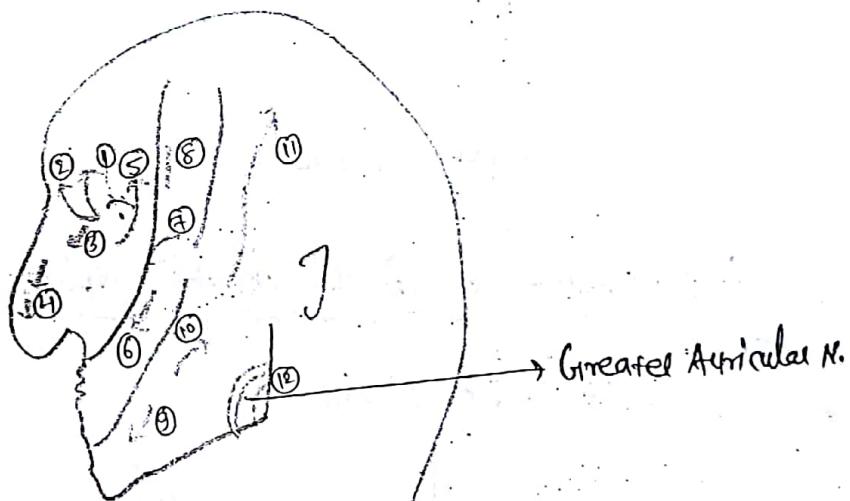
Maxillary

Mandibular

except \Rightarrow Skin over Angle of Mandible

Supplied by Greater Auricular Nerve

Branch of cervical plexus.



1. Supra-orbital N.
2. Subsupra-trochlear N.
3. Infra-trochlear N.
4. External Nasal N.
5. Lacrimal N.

6. Infra-orbital
7. Zygomatico-facial N.
8. Zygomatico-temporal N.

9. Mental N.
10. Buccal N.
11. Auriculotemporal N.

"Tip of Nose & Lower part of glans of Nose" are supplied by this

* Structure piercing Buccinator ⇒

- ① Palotid duct / Stenson duct
- ② Duct of Molal gland;
- ③ Buccal branch of Mandibular Nerve

* Structure pierced by Parotid ducts Are ⇒

1. Buccal Pad of Fat;
2. Buccopharyngeal Fascia;
3. Buccinator Muscle;
4. Mucous Membrane of cheek opposite to 2nd upper Molal teeth;

~~ATM~~ ↗
Buccal branch of Facial Nerve supplies Buccinator but doesn't pierce it.

* Artery supply of Face ⇒

Anastomosis @ the Medial Angle of eye ⇒

External carotid A.



Facial A.

Internal carotid A.



Ophthalmic A.



Dorsal Nasal branch

* Tortuous Arteries → 1. Splenic Artery;



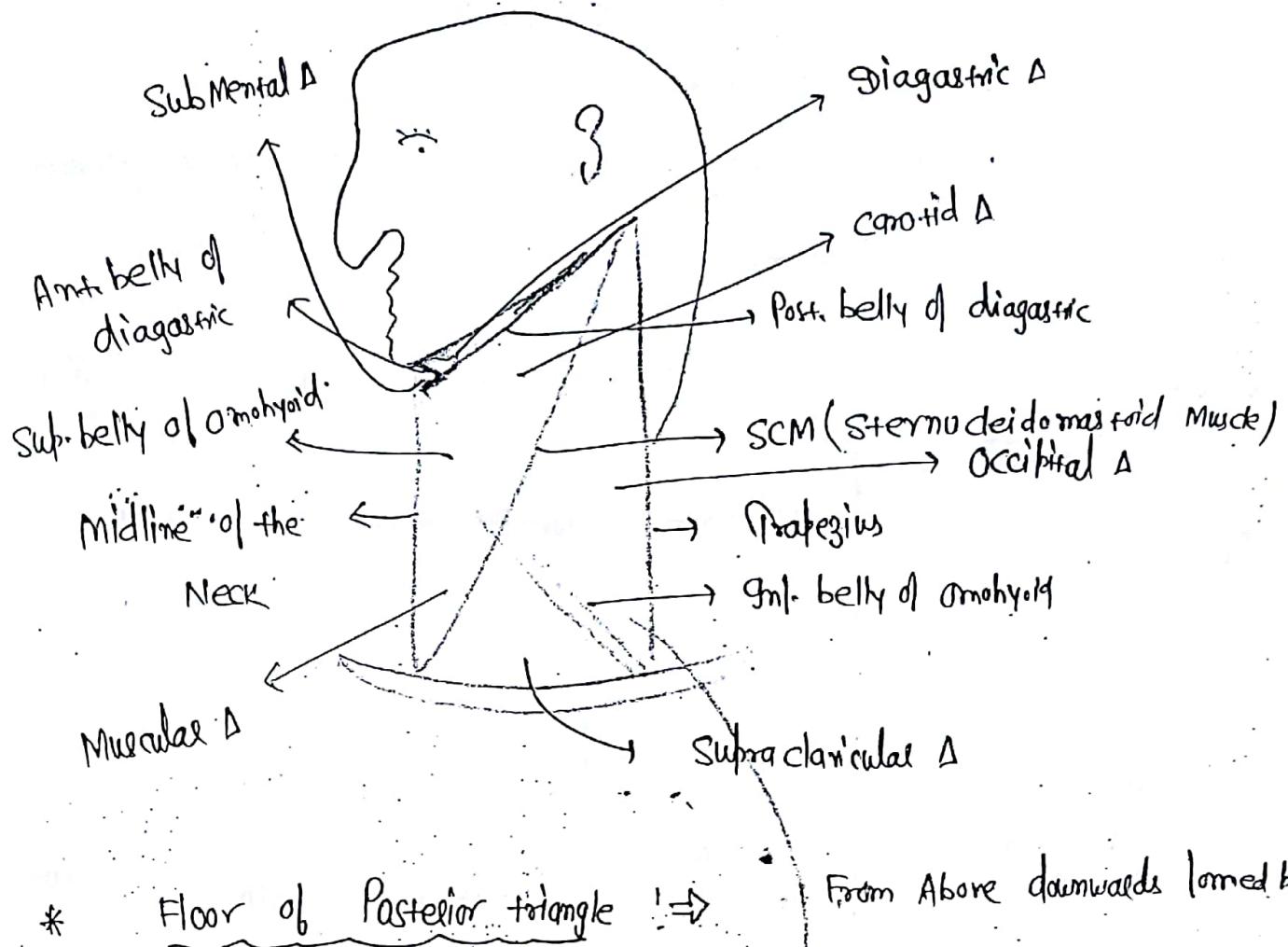
2. Uterine Artery;

3. Facial Artery;

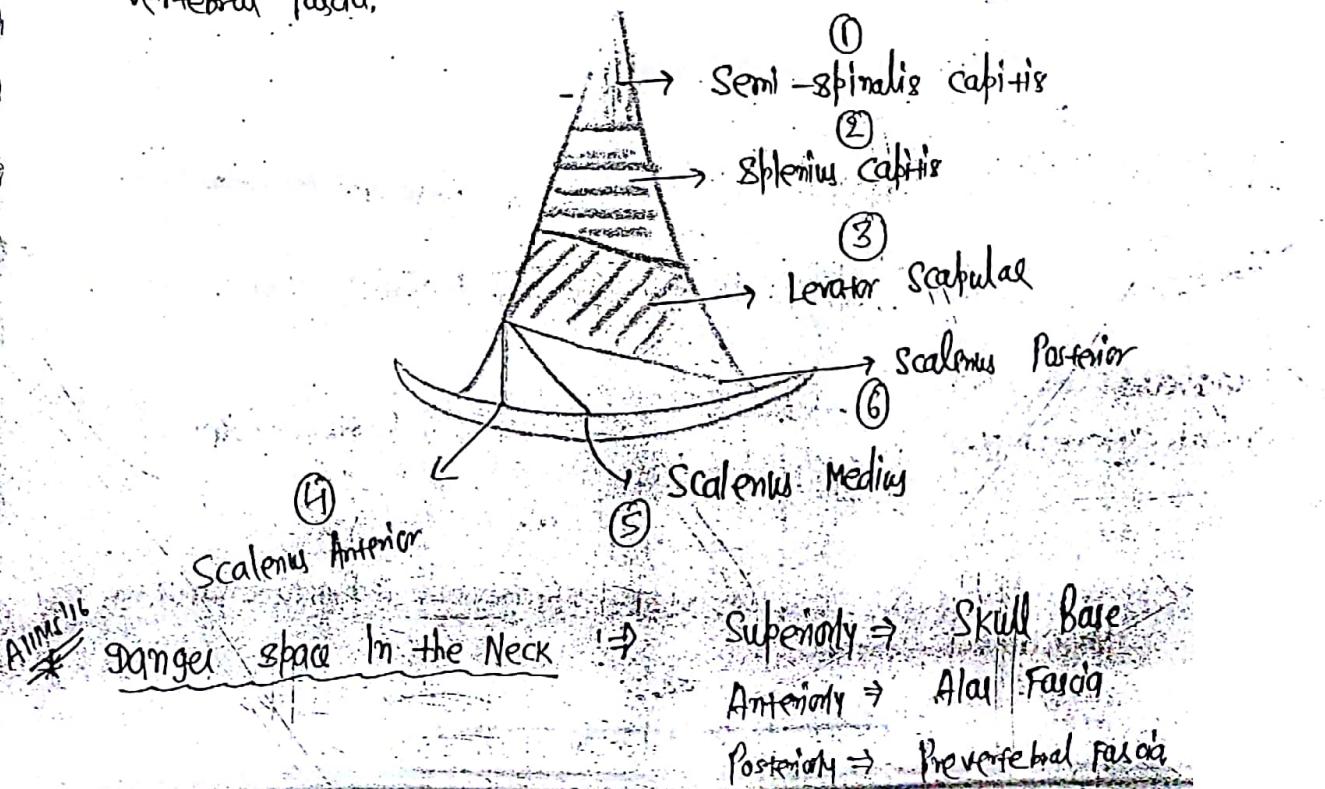
4. PICA (Post. Inf. Cerebellar A.)

This arteries are twists & winds in a "tortuous" path.

TRIANGLES OF THE NECK



- * Floor is covered by Pre-vertebral fascia.
- * Axillary Sheath is derived from pre-vertebral fascia.



Contents of Posterior A \Rightarrow

- a) Sub-clavicular part of brachial plexus;
- b) Subclavian artery;
- c) Spinal Accessory Nerve - Lies on the Levator Scapulae;
- d) Cervical Plexus

Damage to it in the Posterior A of Neck leads to ...

Paralysis of Trapezius

(difficulty in shrugging of shoulder);

(difficulty in overhead Abduction);

(Winging of Scapula).

a) Lesser occipital Nerve (winds around the spinal accessory nerve).

b) Greater Auricular Nerve;

c) Transverse cervical cutaneous N.;

d) Subclavicular Nerve

Medial

Intermediate / Middle

Lateral

Pierces the clavicle

e) Occipital artery.

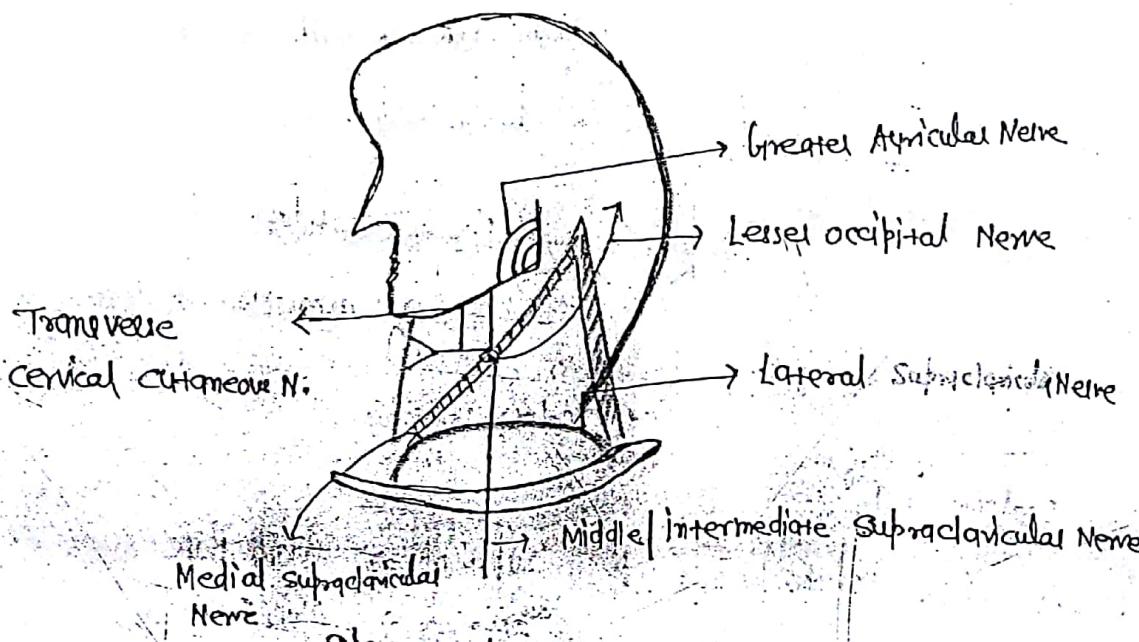


Diagram of cervical plexus in Posterior A

* Clinical sign of different Porto-Systemic circulation

esophageal varices (Bleeding)

Hemorrhoids

Cabut Medwae

PORTAL HYPERTENSION

NEET'16

1. TEMPORARY MUCOSAL FOLDS \Rightarrow Mucosal fold; which are obliterated by distension.
Eg: Gastric Rugae of stomach & Longitudinal fold.
2. PERMANENT MUCOSAL FOLDS \Rightarrow Eg: plica circunflexa (valves of Kerckring) of Small Intestine;
 - Crescentric Mucosal folds of cystic duct (spiral valve of Heister)
 - Transverse (horizontal) Rectal folds (Howson's valve or plica transversalis);
 - Permanent Longitudinal Rectal columns or folds (Found in Lower Rectum. Anal canal).

PETIT TRIANGLE (Inferior Lumbosacral triangle)

NEET'16

Boundaries \Rightarrow Base \Rightarrow Iliac crest.

Anterior Boundary (Abdominal Boundary) \Rightarrow Posterior border of External oblique Muscle

Posterior Boundary (Lumbar Boundary) \Rightarrow Anterior border of Latisimus dorsi

Floor \Rightarrow Internal oblique Muscle

PELVIS

* Structures winding around Ischial spine →

P → : Pudendal Nerve

I → Internal Pudendal vessels

N → N to Obturator Internus

they leave the pelvis through greater sciatic foramen and enter the perineum through lesser sciatic foramen.

- The tendon of obturator Internus emerges out through lesser sciatic foramen.

* Blood supply of Pelvis ⇒

Internal iliac Artery - Small terminal branch of common iliac A.

Anterior division

Posterior division

- Superior Vesical Artery

- Superior Gluteal Artery

- Inferior Vesical Artery

- Lateral Sacral Artery

(Supplies the prostate)

- Middle Rectal Artery

- Ilio-Lumbar Artery

- Obturator Artery

It supplies L vertebral

- Uterinal & Vaginal Artery

While Accessory (Aberrant) Obturator Artery is the branch of Inferior Epigastric Artery

- Superior Gluteal Artery

it is the branch of external iliac Artery

- Internal Pudendal Artery

Inferior epigastric A

Femoral A

Deep circumflex iliac A

→ In female it is replaced by "Uterine & Vaginal Artery".

URETER

- Length \Rightarrow 25 cm (10 inches)
- completely Retroperitoneal organ.

Abdominal Part

Post. Relation \rightarrow Transverse process of Lumbar process;
Psoas Major

Genito-femoral Nerve

Ant. Relation of Right Uretel \rightarrow 3rd Part of duodenum

- R.t. colic vessels
- Ilio-colic vessels
- Root of Mesentery
- Gonadal vessels
- Terminal part of ileum

Ant. Relation of Left Uretel \rightarrow Left colic vessels

Sigmoid. vessels

Sigmoid Mesocolon

Gonadal vessels

Pelvic part - goes backwards along greater Sciatic Notch ab
= internal iliac vessels behind it.

- turns anteriorly at ischial spine & enters the
Sublateral angle of trigone of bladder

- In Males; the ureter is crossed by vas deferens

- In Females; the ureter is crossed by Uterine artery

Blood Supply of Uretel

- ① At its beginning → Renal Artery;
- ② Below it → Abdominal Aorta;
- ③ Little below it → Gonadal Artery;
- ④ At the Pelvic inlet → Internal iliac/common iliac
- ⑤ Near the base of bladder →
 - Superior vesical
 - Inferior vesical
 - Middle Rectal

Constriction of Uretel ⇒ Diameter = 3mm

- ① Pelvi-Ureteric Junction
- ② Crossing of the pelvic brim, bifurcation of common iliacs, crossing of external iliac
- ③ Crossing by the ductus deferens / Broad Ligament
- ④ Entry into the bladder (Narrowest part of Uretel) → Known as "vesicoureteric junction"
- ⑤ Opening into the Trigone

URINARY BLADDER

Retropubic Space of Retzius

↳ Lies behind the Pubic Symphysis

Contains vesicle venous plexus

* except Trigone; Rest all are derived from "Vesicourethral canal" (endodermal)

* 1st desire of Micturition usually appears @ 150-250 ml filling.

* Base of the bladder ↗

In Males →

- Separated from the Rectum in the upper part by Recto vesicle pouch
- Related to vas deferens, Ampulla of vas, seminal vesicle ejaculatory duct.

In Females →

Related to supra-vaginal part of the cervix & vag.

Fascia of Denonvilliers → extends from Rectovesicle pouch to the perineal body

↳ Separates the Rectum from Seminal vesicle & prostate in Males.

* N. Supply ↗

Sympathetic ↗ T₁₀ - L₂

↳ contracts the sphincter & relaxes the Musc

Parasympathetic ↗ S_{2,3,4}

↳ contracts the Muscles & relaxes the sp

* Epithelium of Bladder Mucosa ↗ Transitional

URETHRA

Male Urethra on Section → At bulb →

Triquetrum

In the Penis →

Horizontal slit

At base of glans →

Inverted "T" shape

At external urethral orifice → Vertical slit

Epithelial lining

→ Above the opening of ejaculatory duct
at middle of gland

→ Transitional

→ Columnar

OVARY

- Suspended from posterior leaflet of broad Ligament by Mesovarium.
- Attached to cornu of the uterus by Ligament of ovary and Lateral pelvic walls by suspensory Ligament of ovary/ Infundibulo-pelvic Ligament.

drains into the para-aortic Lymph Nodes.

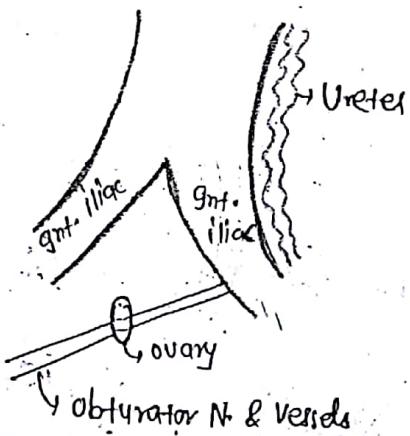
OVARIAN FOSSA

Boundaries

Superiorly → external iliac vessels

Posteriorly → Ureter & internal iliac vessels

Laterally & the floor → obturator Nerve & vessels



UTERUS

FUNDUS

BODY

CERVIX (2.5 cm Long)

- * Round Ligament of Uterus is attached to
 - i) CORNU
 - ii) Labia Majora

* Roof of Posterior triangle \Rightarrow

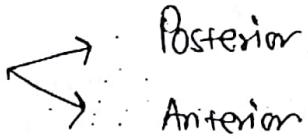
Innervating Layer of Deep cervical fascia -
It encloses \Rightarrow

2 Muscles \Rightarrow a) sterno - clido - Mastoid
b) Trapezius.

2 spaces \Rightarrow a) supra clavicular
b) supra - sternal

2 Glands \Rightarrow a) Sub - Mandibular
b) Parotid

Form Roof for 2 triangles



Anterior Triangle

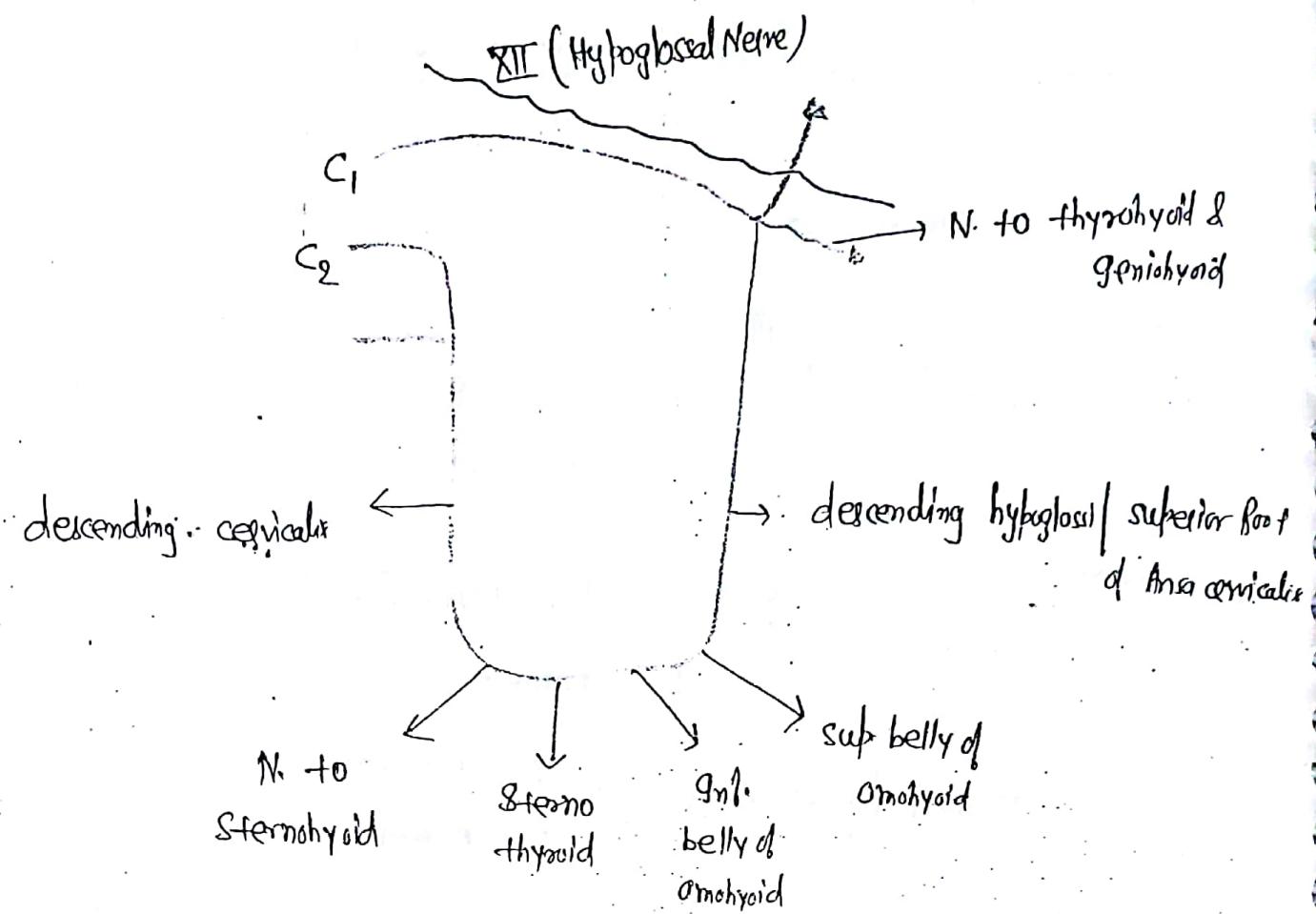
* Muscular A \Rightarrow

- a) Sternohyoid muscle
- b) stemo thyroid muscle
- c) Throhyoid muscle
- d) omohyoid muscle

→ Ghthyoid Ribbon Muscle

ANSA CERVICALIS

* It lies on Anterior wall of omohyoid sheath.



* "Thyrohyoid & Geniohyoid" are supplied by separate branch of C₁ Nerve through hypoglossal nerve.

THE COMMON CAROTID ARTERY

- divides at the superior border of lamina of the thyroid cartilage.
- Muscle b/w the 2 carotids \Rightarrow Styloglossus & stylopharyngeus

- Branches of External carotid Artery \Rightarrow

(A) Anterior Branches \Rightarrow Superior thyroid

Lingual
Facial

(B) Posterior Branch → Post. Auricular
occipital

(C) Medial Branch → Ascending Pharyngeal

(D) Terminal Branch → Superficial temporal
Maxillary

* Carotid Pulse → Can be felt along the SCM muscle @ the Level of Laryngeal prominence or

MUSCLE OF MASTICATION

Masseter

elevation of Mandible

Medial Pterygoid

Vertical fibres → elevation

Temporalis

Posterior fibres → Retraction

Lateral Pterygoid

Upper head → Depression

Lower head → Pro-trusion

N. Supply of all Muscles → Mandibular Nerve

* BOUNDARIES OF POSTERIOR TRIANGLE

Anteriorly → Posterior border of SCM Muscle,

Posteriorly → Anterior Margin of Trapezius;

Base → Superior Surface of Middle third of Clavicle

* BOUNDARIES OF DIAGASTRIC TRIANGLE

Anteriorly → Base of Mandible & A line extending its Angle to Mastoid.

Below & in front → By Anterior Belly of diaphragm

Below & behind → Post. Belly of diaphragm

INTERIOR OF SKULL

① Foramen Rotundum \Rightarrow Maxillary Nerve;

② Foramen ovale \Rightarrow M \rightarrow Mandibular Nerve;

A \rightarrow Accessory Meningeal A.

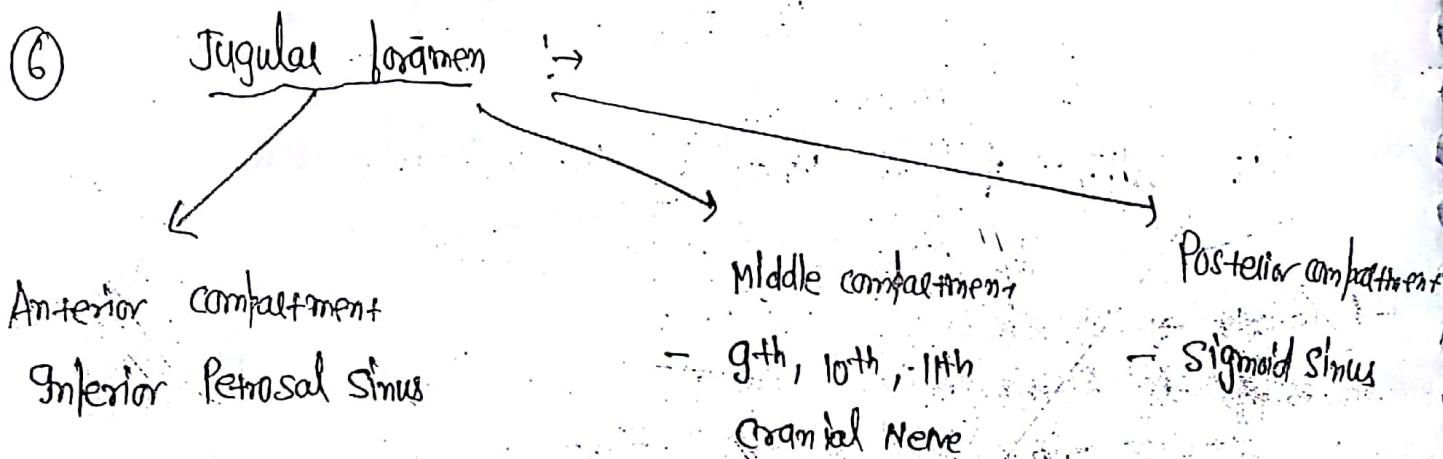
L \rightarrow Lesser Petrosal Nerve

E \rightarrow Emissary vein

③ Foramen Spinosum \Rightarrow Nervus Spinosus / Meningeal branch / Recurrent branch of Mandibular Nerve / Middle meningeal vessels;

④ Foramen Lacrimum \Rightarrow Internal Carotid A

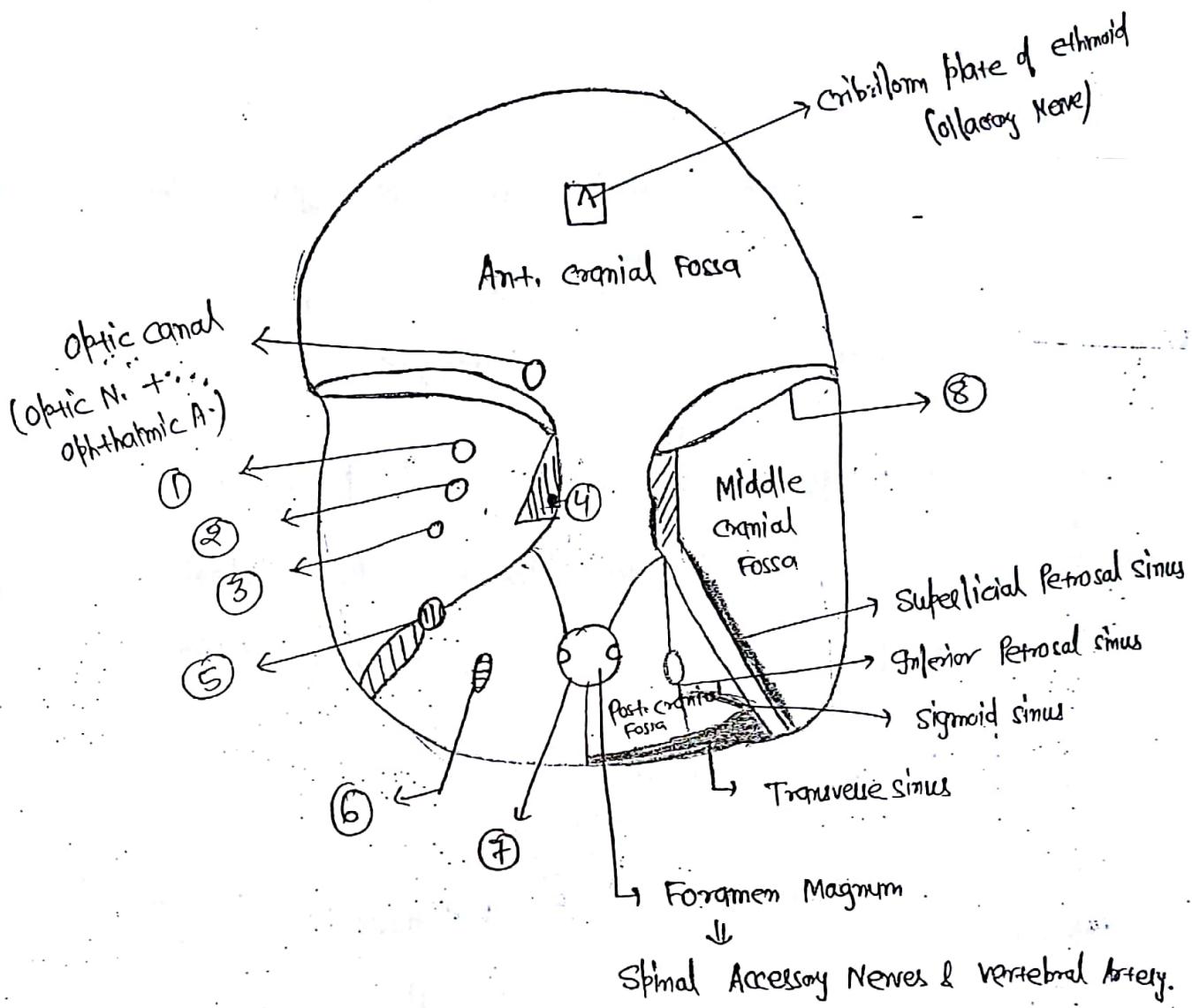
⑤ Internal Acoustic Meatus \Rightarrow 7th, 8th & Labyrinthine vessels



⑦ Hypoglossal canal | Anterior Condylar canal \Rightarrow Hypoglossal N.

⑧ Sub. orbital fissure \Rightarrow 3rd, 4th, 6th C.N. & Optic N.

⑨ Optic canal \Rightarrow Optic Nerve & ophthalmic Artery.



* Meckel's Cave \rightarrow Trigeminal Ganglion lies in it.
(Gasserian ganglion)

\rightarrow Cave like formation of dura mater

* Contents of Parotid gland (superficial to deep) \rightarrow 1. Facial Nerve
2. Retromandibular vein
3. External Carotid Artery

* Pterygoid canal \rightarrow Vidian Nerve (N. of Pterygoid canal)
Vidian Artery (Artery of Pterygoid canal)

N. of Pterygoid canal is formed by the junction of the greater petrosal N.

NEEG 16
10/10

MANDIBULAR NERVE

- i) Branches from the trunk;

 ↳ ① N. Spinous
 ↓

Enters the skull through foramen spinosum
& supplies the meninges of middle cranial fossa.

 ② N. to Medial Pterygoid
 ↓

Supplies the Medial Pterygoid

↳ also supplies Tensor Palati;

Tensor tympani

- ii) Anterior division

3 Muscular

1 Sensory | cutaneous

 - Buccal-Nerve

 ↓
 Supplies the skin & mucous membrane over the buccinator

- Masseteric Nerve

- Deep temporal Nerve

- N to Lateral Pterygoid

- iii) Posterior division

Lingual N.

Auriculo-temporal N.

Posterior alveolar N.

Lingual Nerve \Rightarrow Supplies General Sensation to Ant. 2/3rd of tongue
- It is joined by chorda tympani; which supplies special sensation to Anterior 2/3rd of tongue.

Auriculo-temporal Nerve \Rightarrow Supplies the skin over the Auricle & temporal Region
↳ It also carries the post-ganglionic parasympathetic fibres from Otic ganglia to Parotid gland.

Inferior Alveolar Nerve \Rightarrow Dentist. Nerve

- Enters the Mandibular Foramen; supplies the Lower jaw & teeth & emerges as Mental Nerve.
- Before entering the Mandibular foramen; it gives a branch - N. to Mylohyoid which supplies Mylohyoid & An. belly of digastric Muscle

MAXILLARY ARTERY

- Branch of external carotid; given in Parotid gland
- divided into 3 parts by Lateral Pterygoid Muscle
 - extends upto lower border of Lateral Pterygoid Muscle.

(I)

1st part \Rightarrow Deep Auricular A.



(Mandibular part)

Anterior tympanic A.

Middle meningeal A.

Accessory meningeal A.

Anterior alveolar A.

↳ Lies in infra-temporal fossa

(II)

2nd part \Rightarrow

Masseteric A.



(Pterygoid part)

Deep temporal A.

Art. to the Pterygoid

Buccal Artery

III 3rd Pal+ \Rightarrow

(Pterygo-palatine for.)



Lies in pterygo-palatine fossa.

Post. superior alveolar A.

Intra-orbital A.

Greater palatine A.

Pharyngeal A.

Artery of Pterygoid canal A.

Sphenopalatine A. (Artery of epiphysis)

AUTONOMIC NERVOUS SYSTEM

Sympathetic Nervous System \Rightarrow

The preganglionic fibres arises from Lateral horn cells of T₁ to L₂ segments of the spinal cord,

- They pass through ventral root; spinal nerve & enters the Symp. ganglion through white Rami communicans
- Thus white Rami communicans are prf. in T₁-L₂ spinal nerves
- The fibres goes to higher & lower ganglion;
- The Post-ganglionic fibres enter the spinal nerve through Grey Rami communicans
- Thus Grey Rami communicans is given to all the spinal nerve

Parasympathetic Nervous System

AIMC Nov'16

Cranial outflow

- Arises in the brain stem
- Carried by 3rd, 7th, 9th & 10th CN
- They supply the glands

* All the glands in the head & Neck are supplied by Facial Nerve except →

Parotid gland
||

Supplied by Glossopharyngeal Nerve

* Vagus supplies the gland of GIT

* 3rd CN. supplies ⇒ Sphincter pupillae & ciliaris Muscle.
→ No gland supply.

GANGLION

↳ Collection of Neuronal cells body outside the CNS.

3/7/9/10 CN
(Brain Stem)

Pre-ganglionic

Structural Relation

Post-ganglionic

Glands

Functional Relation

Pterygopalatine	Ciliary ganglion	Otic ganglion	Submandibular ganglion
Ganglion [Spheno-palatine ganglion] (Largest P.S. Ganglion)			
Structural Maxillary N.	Nasociliary N.	Mandibular N.	Lingual N.

Functional

VII

III

IX

VII

OTIC GANGLION \Rightarrow Relation \Rightarrow Superiorly : Foramen Oval:

Laterally : Mandibular Nerve

Medially : Tensor Veli Palatini

Posteriorly : Middle Meningeal A.

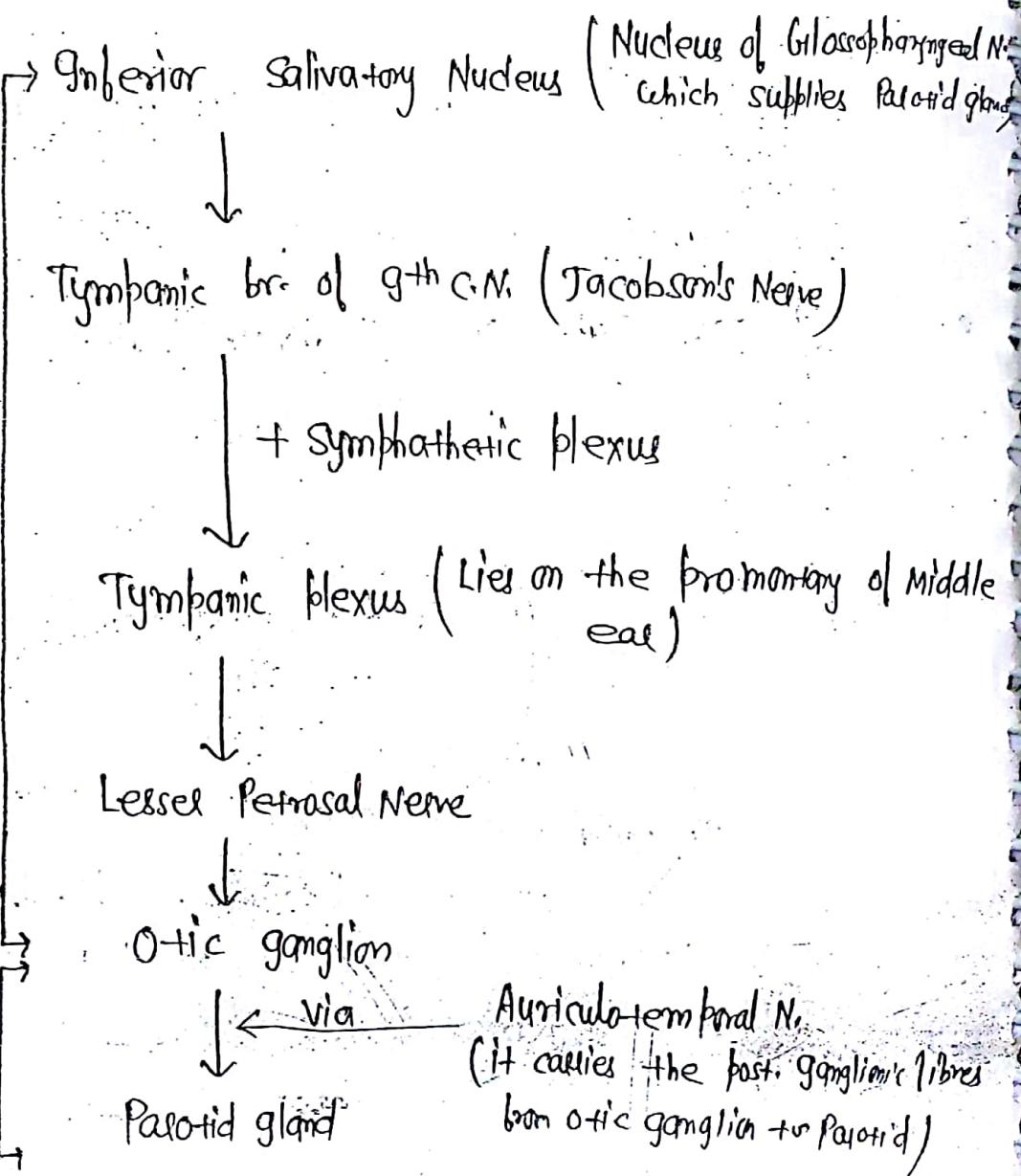
* Otic ganglion usually surrounds the origin of the N. to Medial Pterygoid

NERVE SUPPLY OF PAROTID GLAND \Rightarrow

Preganglionic

Supplies the
Middle ear cavity;
Eustachian tube;
Mastoid Antrum

Post-ganglionic



FACIAL NERVE

Superior Salivatory Nucleus (Nucleus of Facial N.)



Sensory br. of Facial Nerve
(Nervus Intermedius / N. of Wrisberg)

Trunk of Facial N. (in the Internal ear)



Gleniculate ganglion (Bend | Genus of Facial Nerve)

Greater Petrosal N.

N. to Stapedius

Stylomastoid
↑
Parotid Glands
N. to Chorda tympani

* Chorda tympani emerges out through Petro-tympanic fissure

Sub Mandibular ganglion

Join & Lingual

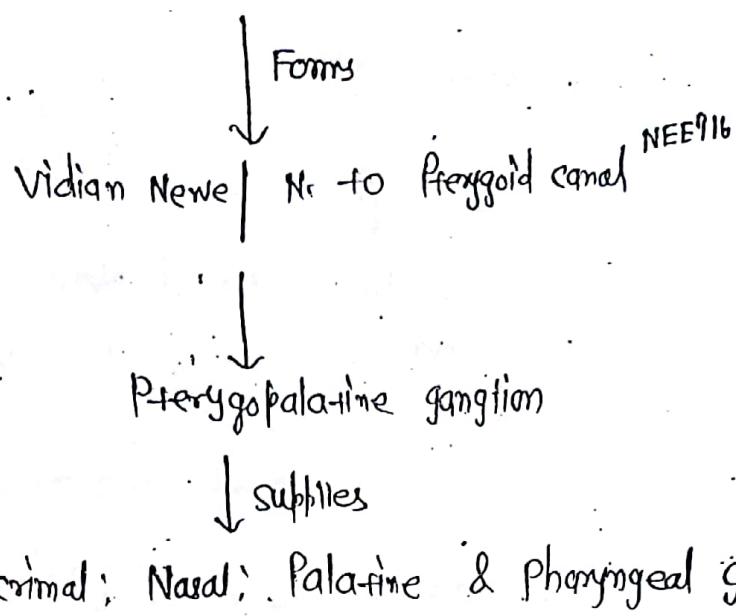
& supplies

Sub Mandibular gland

Lingual gland

taste fibres from ant 2/3rd of tongue (except circumvallate papillae)

* Greater Petrosal Nerve joins \cong deep petrosal N.



- * Crocodile tears involves submandibular & lacrimal gland.
- * Vidian Nerve irritation \Rightarrow symptom of Allergic Rhinitis occul.

FUNCTIONAL COMPONENT OF NUCLEUS

① SPECIAL VISCERAL EFFERENT / BRANCHIO-MOTOR COMPONENT !

- Supplies the muscle derived from the laryngeal arches.
- In 5, 7, 9, 10th CN.
- Common Nucleus for 9th; 10th & cranial accessory (11th CN) is Nucleus Ambiguus

② General visceral efferent / Secreto-Motor COMPONENT !

Supplies the gland

It represents the cranial outflow of the parasympathetic nervous system

→ In 3, 7, 9, 10th CNs

③ General Somatic element \Rightarrow

- Supplies the Muscle derived from occipital somites (Myotome)
(extra-ocular & tongue Muscle)
- Inf in 3rd; 4th; 6th; 12th C.N.

* Blood Supply of Facial Nerve

- ① In Facial canal \rightarrow ② Superficial petrosal branch of Middle Meningeal Artery;
- ③ Stylomasstoid branch of Posterior Auricular or occipital Arteries,

- ④ Extracranially \rightarrow ⑤ Stylomasstoid branch of Posterior Auricular or occipital arteries
- ⑥ Tympanic branch of Ascending pharyngeal Artery.

SINUSES

* DURAL VENOUS SINUS \Rightarrow It is outer to Meningeal Layer inner to endosteal Layer.

The duramater divides into an endosteal and Meningeal layers to encloses the dural venous sinus.

* Superior Sagittal Sinus



Rr. transverse



Rr. sigmoid



Rr. internal jugular vny.

* Inferior Sagittal Sinus



Straight Sinus



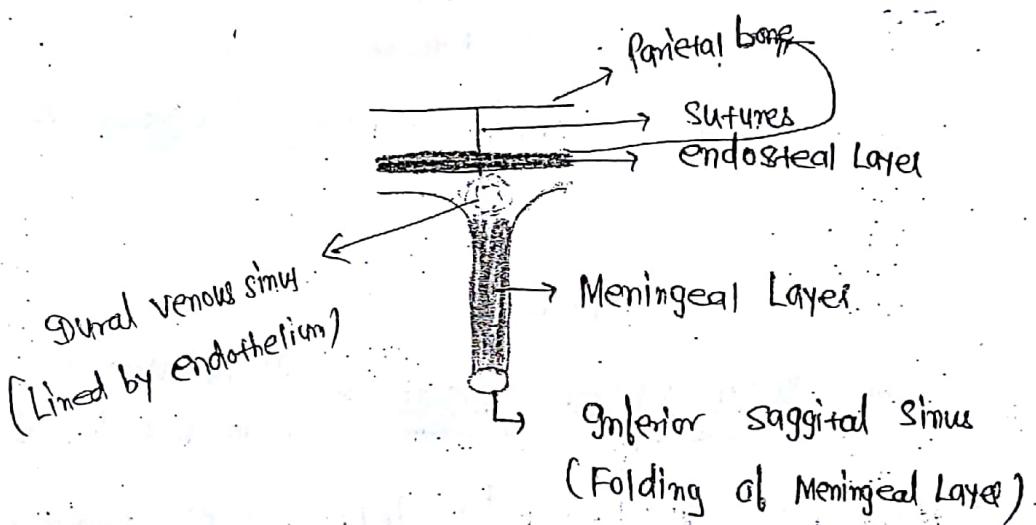
Lt. framework



Lt. Sigmoid

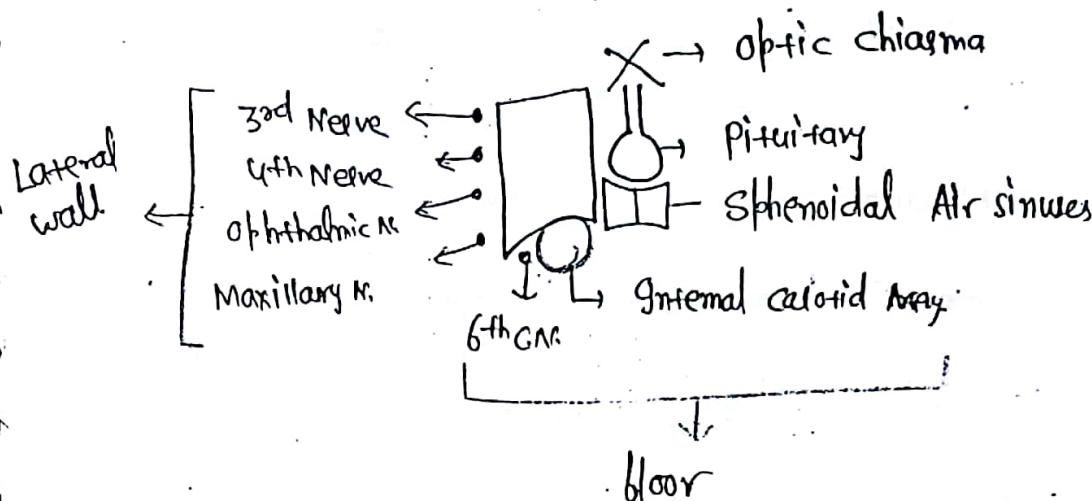


Lt. Internal jugular vein



- * Falx cerebri \Rightarrow It contains Superior sagittal sinus & straight sinus.
- * Falx cerebelli \Rightarrow Enclosed occipital Sinus
- * Great cerebral vein of Galen \Rightarrow It is formed by the Union of two Internal cerebral veins; is 2 cm long & drains into the straight sinus.

CAVERNOUS SINUS



* Tributaries of cavernous sinus (Coming towards c.s.)

From the orbit

- Sub. ophthalmic vein
- Gnl. ophthalmic vein
- Central vein of Retina

From the meninges

- Spheno-parietal sinus

From the brain

- Superficial Middle cerebral vein
- Inferior cerebral v.

* Draining channels (Away from cavernous sinus)

- ① Superior petrosal sinus \Rightarrow drains cavernous sinus to transverse sinus
- ② Inferior petrosal sinus \Rightarrow drain cavernous sinus to internal jugular vein, sigmoid sinus
- ③ The two cavernous sinuses are connected by an anterior & posterior inter-cavernous sinuses
- ④ The cavernous sinus drains into lacrimal venous plexus through emissary veins

THE PHARYNX \Rightarrow extends from base of skull to the level of 6th cervical vertebra.

i) Structure passing b/w the Superior constrictor & base of skull | sinus of Morgagni \Rightarrow

a) Eustachian tube Mnemonics \Rightarrow PALE

b) Levator palati Muscle

NEED c) Ascending Palatine A.

d) Palatine branches of ascending pharyngeal A

ii) Structure passing b/w Superior & Middle constrictor \Rightarrow

a) Stylopharyngeus Muscle;

b) Glossopharyngeal Nerve;

iii) b/w the Middle & inferior constrictor \Rightarrow

a) Internal Laryngeal Nerve

b) Superior Laryngeal vessels

iv) Below the anterior constrictor \Rightarrow

a) Recurrent Laryngeal N.

b) Inferior Laryngeal vessels

* Tensors of vocal cords \Rightarrow cricothyroid

Substituted by External Laryngeal Nerve.

Paralysis results in "Loss of Timber of the voice".

* Abductor of vocal cord \Rightarrow Post. crico-arytenoid

* Sartorius Muscle of tongue \Rightarrow genioglossus

- * In lesions of hyoglossal N. the tongue is ~~not~~ deviated to same side of lesion.
- * Intrinsic Muscle of Pharynx \Rightarrow Stylopharyngeus; Salpingopharyngeus; Palatopharyngeus.
- * Extrinsic Muscle of Pharynx \Rightarrow Superior Constrictor; Middle Constrictor; Inferior Constrictor.
- * Foramen of Morgagni \Rightarrow Located in Thoracic Diaphragm; from which Superior epigastric A. Cerv & Lymphatics passes.
- It is also known "Sternocostal Hiatus or Larey's A"
- * Retropharyngeal space \Rightarrow Potential space of the head & Neck; bounded by the buccopharyngeal fascia Anteriorly & the Alar fascia Posteriorly.
- * Pharynx is Subdivided into
 - \rightarrow Nasopharynx \rightarrow Lined by ciliated columnar epithelium & Lies above the soft palate
 - \rightarrow Oropharynx
 - \rightarrow Hypopharynx
- * Pharyngeal opening of Eustachion tube is situated 1.25 cm behind the posterior end of inferior turbinate
- * Key Muscle of the oral Region \Rightarrow Hyoglossus
- * Structure Superficial to Hyoglossus Nerve \Rightarrow
 - Lingual Nerve
 - Submandibular ganglion
 - deep part of Submandibular gland
 - Submandibular duct
 - Hyoglossal Nerve
- * Structure deep to Hyoglossus Muscle \Rightarrow Glossopharyngeal Nerve
Lingual Artery
- * Structure loop around Submandibular duct \Rightarrow Lingual Nerve

PHARYNGEAL ARCHES

ECTODERMAL CLEFTS ⇒

1st E.C. ⇒ Forms the external Acoustic Meatus & Pinna

2nd E.C. ⇒ grows down & fuses w/ the last



The Neck thus become smooth;
if it doesn't fuse → Branchial Sinus/Fistula

ENDODERMAL POUCHES ⇒

First Endodermal Pouch

Dorsal

Ventral

- Forms the tubo-tympanic Recess; which forms Middle ear cavity & eustachian tube.
- Joins w/ the 2nd & forms the palatine tonsil.

Second Endodermal Pouch

- Joins w/ ventral part of 1st EP & forms the palatine tonsil.

Third Endodermal Pouch

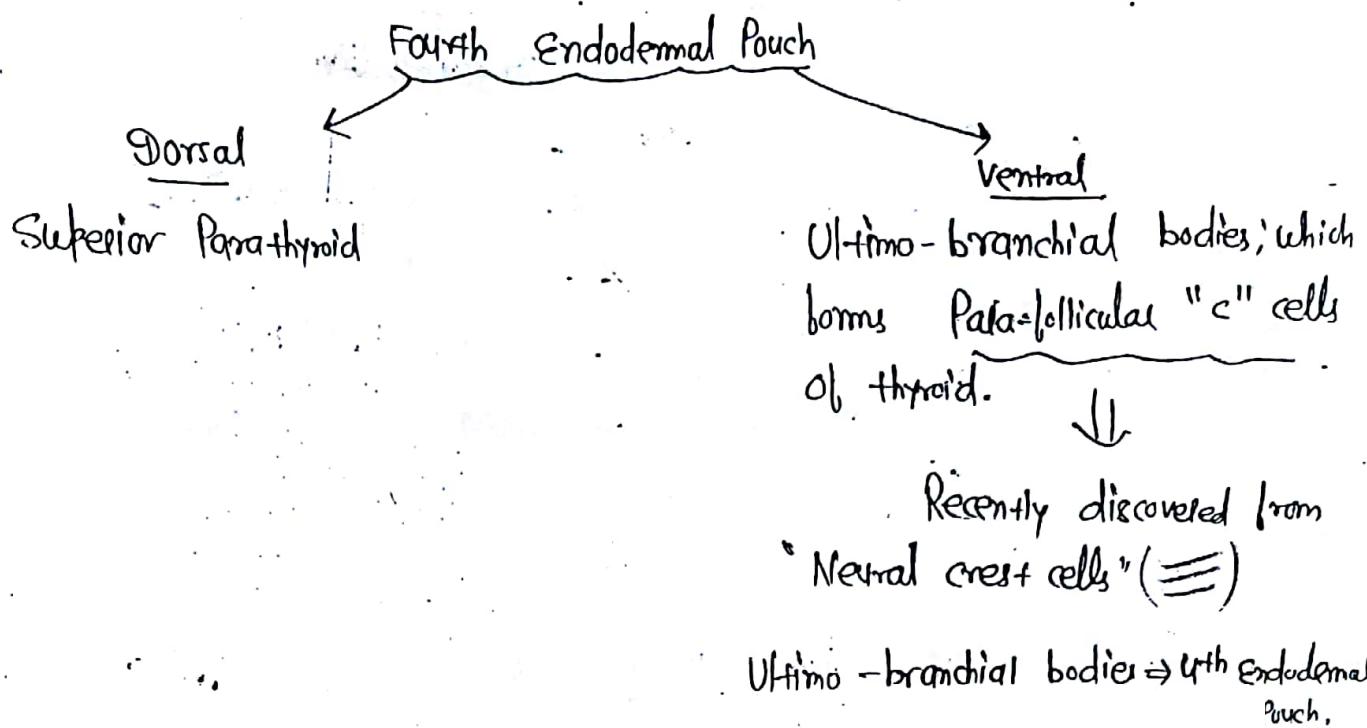
Dorsal



Anterior Parathyroid

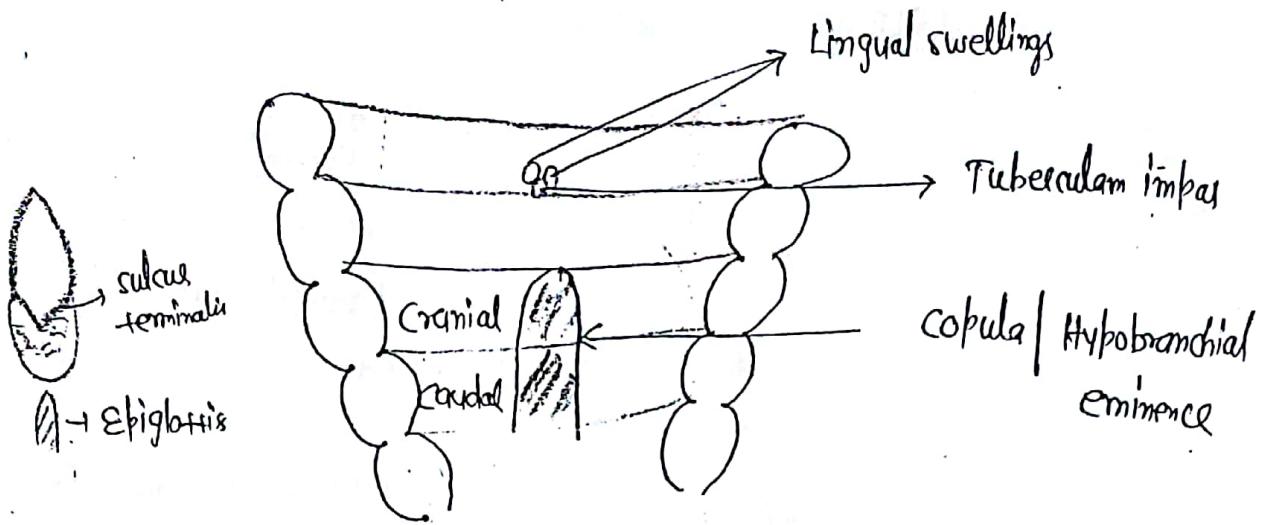
Ventral

Forms the thymus



DEVELOPMENT OF TONGUE

- Ant. 2/3rd of the tongue is derived from → 2 Lingual swellings & Tuberkulum impar.
- Post. 1/3rd of the tongue is derived from → cranial part of hypo-branchial eminence / cotyla
- Post. Most. part of the tongue & epiglottis is derived from cauda part of hypo-branchial eminence.
- Muscles of the tongue are derived from → occipital Myotomes.



* NERVE SUPPLY OF TONGUE : →

<u>PART</u>	<u>MOTOR</u>	<u>GENERAL (TOUCH & TEMP.)</u>
Anterior 2/3rd (oral part) except → circumvallate papillae)	chorda tympani (Facial Nerve)	Lingual branch of Mandibular division of Trigeminal Nerve
Posterior 1/3rd including circumvallate papillae	Glossopharyngeal	Glossopharyngeal
Posterior Most part	Internal Laryngeal branch of vagus	Internal Laryngeal branch of vagus

* Delphian Nodes ⇒ Klaus "Pre-Laryngeal Nodes".

DEVELOPMENT OF FACE

→ 5 Processes which takes part in formation of Face :-

- 1 Frontonasal process
- 2 Maxillary process
- 2 Mandibular process

- * Midline upper lip cleft ⇒ dl + Non-fusion of 2 Medial Nasal process
- * Hare lip | cleft lip ⇒ dl + Non-fusion of Maxillary process & medial Nasal process
- * oblique facial cleft ⇒ Non-fusion of Maxillary process & Lateral Nasal process
- * Midline lower lip cleft ⇒ Non-fusion of 2 Mandibular process

DEVELOPMENT OF HARD PALATE

Primary | primitive palate | pre-Maxilla

Secondary
||

↓
Fusion of two Medial Nasal process

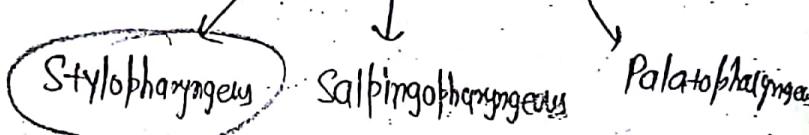
↓
Fusion of two palatine process of Maxilla

* The Incisive foramen differentiates b/w Primary & secondary palate

PHARYNGEAL PLEXUSES

- Formed by → a) pharyngeal branch of glossopharyngeal Nerve,
- b) Pharyngeal branch of vagus ∈ cranial accessory
- c) A branch from superior cervical ganglion

→ The Pharyngeal plexuses lies on Middle constrictor Muscle of the pharynx.

- It supplies →
 - ① All the muscles of soft palate except tensor palati.
↓
Supplied by Mandibular N. through the Nerve to Medial Pterygoid.
 - ② All longitudinal muscle of pharynx.
↓

Supplied by glossopharyngeal Nerve.
 - ③ All the circular muscle of pharynx except cricopharyngeus part of Inf. constrictor.
↓
External / Recurrent Laryngeal N.

VAGUS NERVE

Superior Laryngeal (4th Pharyngeal Arch)

Recurrent Laryngeal (6th pharyngeal Arch)

Internal Laryngeal

External Laryngeal



Supplies the
Cricothyroid.

pierces the thyrothyroid

Membrane; passes b/w

Middle & Inferior

Constrictor; to supply

the mucous membrane of

the larynx above vocal folds.

- also supplies Posterior
Most part of Tongue &
Epiglottis

- Lies in the tracheo-esophageal groove
- passes below Inferior ^{all} Constrictor to supply v Muscle of larynx except crico-thyroid
- Sensory supply below the vocal Folds.

BRAIN

Central sulcus is klaus \Rightarrow Sulcus of Rolando.

Lateral sulcus is klaus \Rightarrow Sylvian fissure.

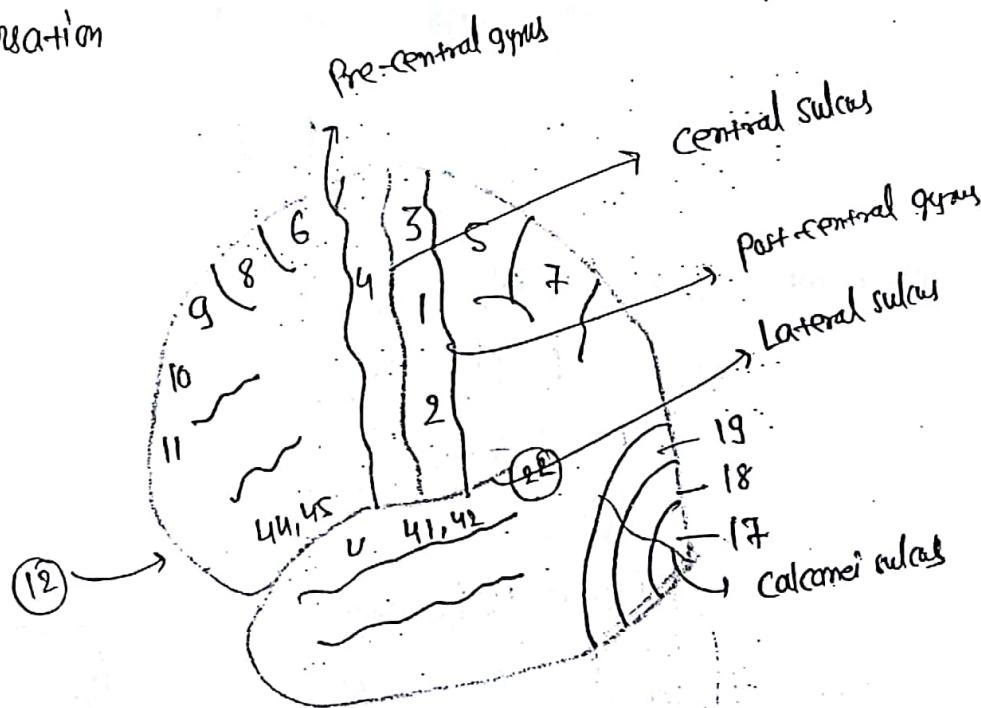
* Functional Areas \Rightarrow

Primary Area

- Perception of sensation

Association Area

- Interpretation of sensation



Area 3,1,2 \Rightarrow 1⁰ sensory Area

Crude sensation \Rightarrow Touch; Palm; temperature

Fine sensation \Rightarrow Tactile localization;

Tactile discrimination;

Stereognosis;

Vibration;

Proprioception.

1st ORDER NEURON

Crude sensation

Dorsal Root
Ganglion

Fine sensation

Dorsal Root
Ganglion

2nd ORDER NEURON

Dorsal horn cells
of spinal cord
(Substantia gelatinosa)

3rd ORDER NEURON

Thalamus
(Vento-postero-
Lateral Nucleus)

Nucleus gracilis &

Nucleus cuneatus

Thalamus -
(Vento-fascio-
Lateral Nucleus)

Area 5, 4 \Rightarrow

Sensory Association Area

Area 17 \Rightarrow

Primary visual Area

Visual Pathway \Rightarrow

Retina



Optic Nerve



Optic chiasma



Optic tract



Lateral geniculate body



Optic Radiate (Retro tentorial part of internal capsule)



Area 17

Area 18, 19 \Rightarrow visual Association Areas

* Damage to Area 18, 19 leads to \Rightarrow visual Agnosia / word blindness

Area 41, 42 \Rightarrow Primary Auditory Area

Auditory pathway \Rightarrow Organ of Corti



Dorsal & ventral cochlear Nucleus (+) in Medulla oblongata



Superior olive Nucleus



Trapezoid body



Lateral Lemniscus



Posterior colliculus



Medial geniculate body



Auditory Radiation (Subtentorial part of Internal capsule)



Area No. 41, 42 (Cortex)

Area No. 22 ⇒ Sensory speech Area / Wernicke's Area

* Damage to 22 leads to ⇒ Auditory agnosia / word deafness

* Area 41, 42 damage ⇒ deaf.

Area No. 44, 45 ⇒ Broca's Area / Motor speech Area

* Arcuate fasciculus / Uncinate fasciculus ⇒ Connects the Wernicke's & Broca's Area. (Connect Frontal to temporal lobe)

Area No. 4 ⇒ 1^o Motor Area

funcⁿ ⇒ Initiation of Movements

* Large Pyramidal cells is Klar ⇒ "Betz cells"

Descending fibres



Corticospinal



Area No. 4

- Internal capsule
(Posterior limb)



Mid brain (Cruus cerebri)



Pons (Basilar part)



Medulla (Pyramids)



Spinal cord (Anterior horn cells)

Corticospinal



Area No. 4

- Internal capsule (Genu)



Brain Stem (Nuclei of the cranial nerves)

Area No. 6,8 → Pre-Motor Area

↳ Execution of Movements

Area No. 9,10,11,12 → Pre-frontal Area

↳ Function ⇒ Intelligence; Memory; ego & self-Reflection
(Personality | Social behaviour)

* Pterion ⇒ It is the Region where the Frontal; Parietal; Temporal & Sphenoid joined together.

- It is the "Weakest part of the skull".
- The Anterior division of Middle Meningeal Artery runs underneat the pterion.

* FRONTAL LOBE ⇒ It has following functional Areas:

i) Motor Cortex ⇒ Brodmann's Area 4;

ii) Premotor Cortex ⇒ Areas 6,8;

iii) Supplementary Motor Area ⇒ Area No. ⑥, ⑧

iv) Frontal eye field ⇒ Area No. ⑥, ⑧, ⑨

↳ Located in Posterior part of Middle frontal gyrus.

v) Broca's Motor Speech Area ⇒ Area No. ④, ⑤

↳ Located in Posterior part of Inferior frontal gyrus.

vi) Prefrontal Area ⇒ Area No. ⑨, ⑩, ⑪, ⑫

* PARIETAL LOBE \Rightarrow \rightarrow Primary Somato sensory Cortex
 \downarrow
Area No. ③, ①, ②

ii) Somato Sensory Association Area \rightarrow

a) Superior Parietal Lobule \rightarrow Area No. ⑤, ⑦

b) Subcentral Gyrus \rightarrow Area No. ④

c) Angular Gyrus \rightarrow Area No. ③

* TEMPORAL LOBE \Rightarrow \rightarrow Primary Auditory Area
 \downarrow
Area No. ④①, ④②

ii) Auditory Association cortex (Secondary Auditory Area)

\downarrow
Area No. ⑨

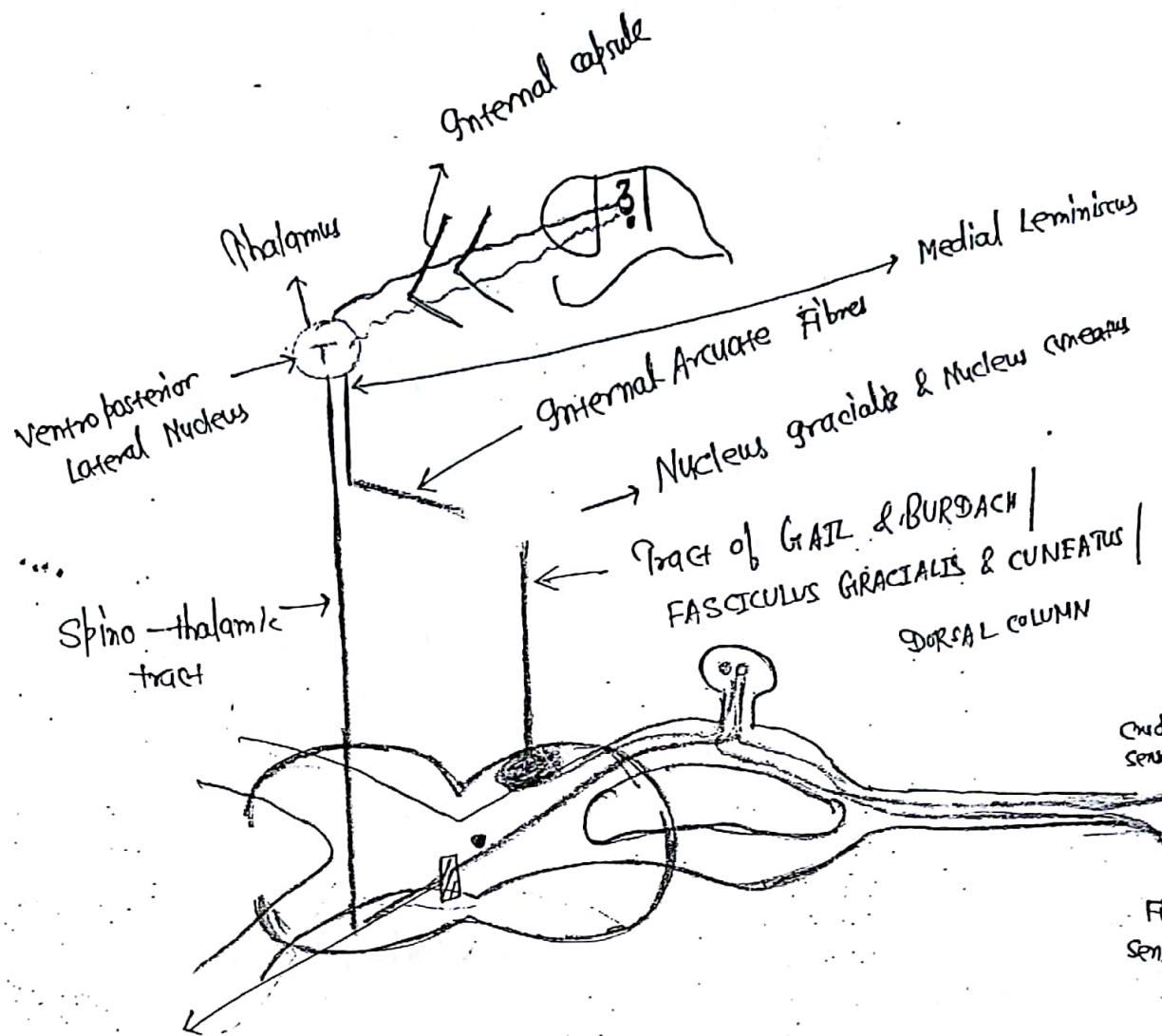
- It includes Wernicke's speech Area & is located in posterior part of Superior temporal gyrus.

* OCCIPITAL LOBE \Rightarrow \rightarrow Primary visual cortex

\downarrow
Striate Area; Area No. ⑪

ii) Visual Association Areas

\downarrow
Secondary visual Area; Area No. ⑬, ⑭



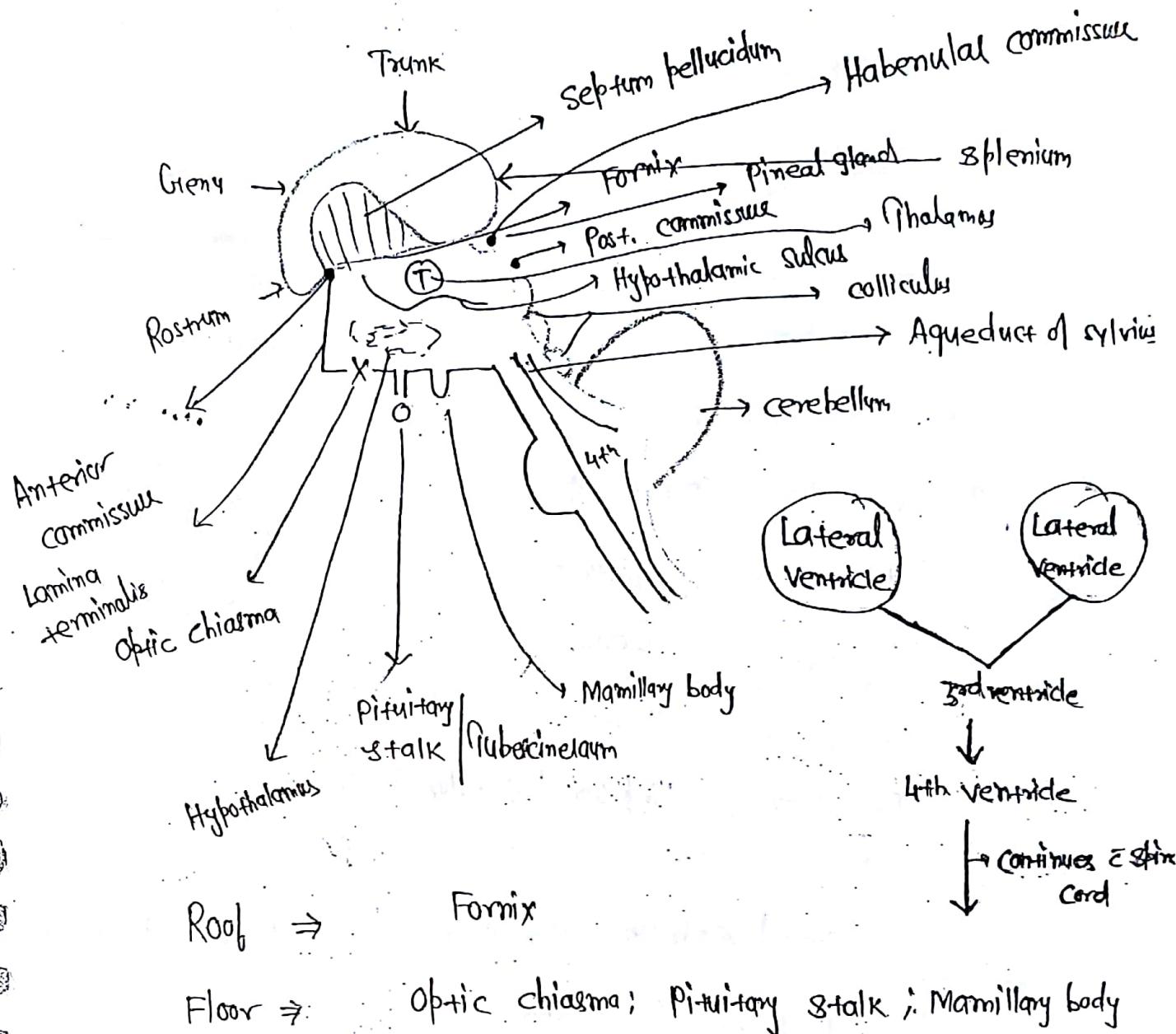
Syringomyelia

- ↳ Fine sensations all intact.
- All crude sensation all lost.



IIIrd ventricle

epithalamus \Rightarrow Habenular commissure + pineal gland + Post. commissure



Roof \Rightarrow Fornix

Floor \Rightarrow Optic chiasma; Pituitary stalk; Mamillary body

Ant. wall \Rightarrow Ant. Commissure & Lamina terminalis

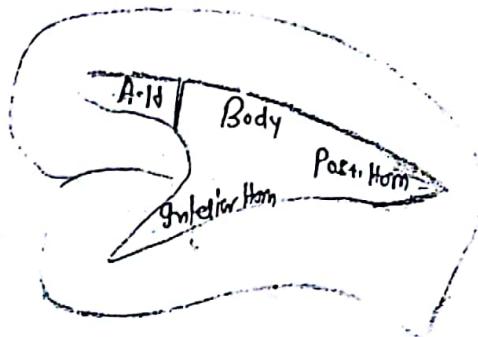
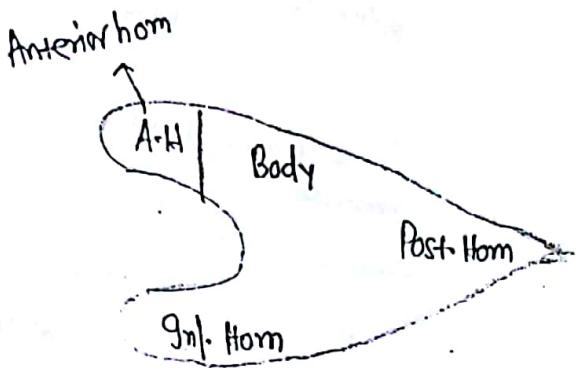
Post. wall \Rightarrow Pineal gland; Post. commissure & habenular commissure

Lateral wall \Rightarrow Thalamus & hypothalamus

* Ventricles \Rightarrow There are the cavities in the brain lined by "Ependyma & CSF!"

LATERAL VENTRICLE

Part 8 ↗



Relations of Anterior Horn ↗

Floor ⇒ Rostrum

Anterior ⇒ Genu

Roof ⇒ Trunk

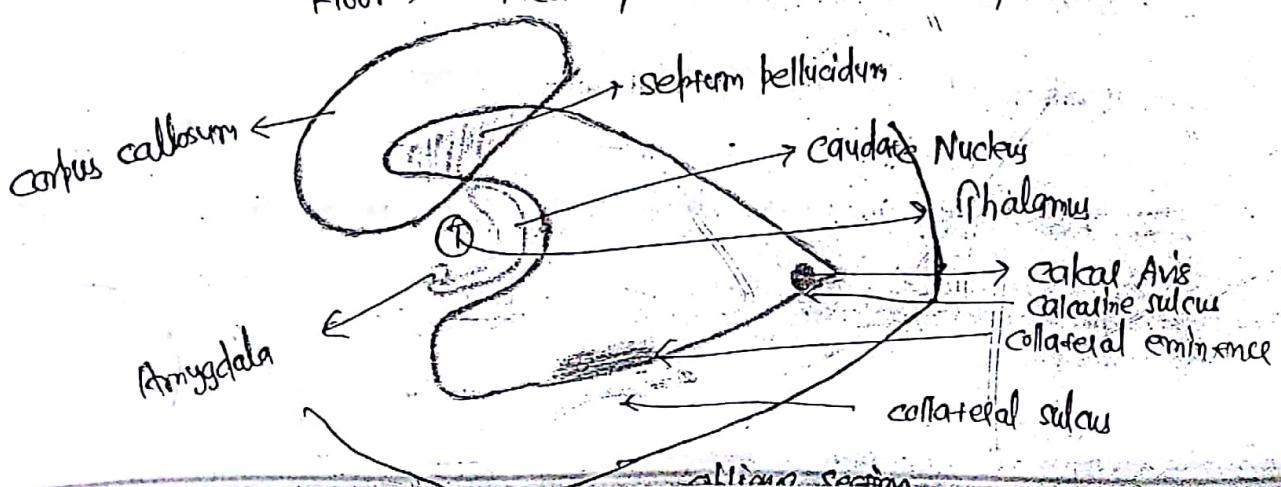
Medial ⇒ Septum pellucidum & Fornix

Body of Lateral Ventricle ↗

Roof ⇒ Trunk

Medial ⇒ Septum pellucidum & the fornix

Floor ⇒ Medially thalamus & laterally caudate Nucleus



- * Posterior Horn & Ant. Horn \Rightarrow Both has No choroidal plexus.
- * Body & Gnd. form \Rightarrow have choroidal plexus.
- * Interventricular foramina or foramina of Monro \Rightarrow Connects 3rd ventricle to Lateral ventricle.

COMPLETE SULCUS

- is the one which forms an elevation in the floor of the lateral ventricle

e.g. calcaneal Sulcus \Rightarrow Forms an elevation in the floor of Posterior Horn

\downarrow
Calcal Avis

Collateral Sulcus \Rightarrow

Forms an elevation in the floor of Anterior horn

\downarrow
Collateral eminence.

* if both are in option \Rightarrow collateral $>$ calcaneal

BLOOD SUPPLY OF BRAIN

(A) Vertebral Artery \Rightarrow Enters into the foramen transversum of C6 vertebral

- crosses the Arch of Atlas & enters the skull through foramen Magnum

- Two vertebral joins to form Basilar Artery

Branches \Rightarrow

- Anterior spinal Artery
- Posterior spinal Artery

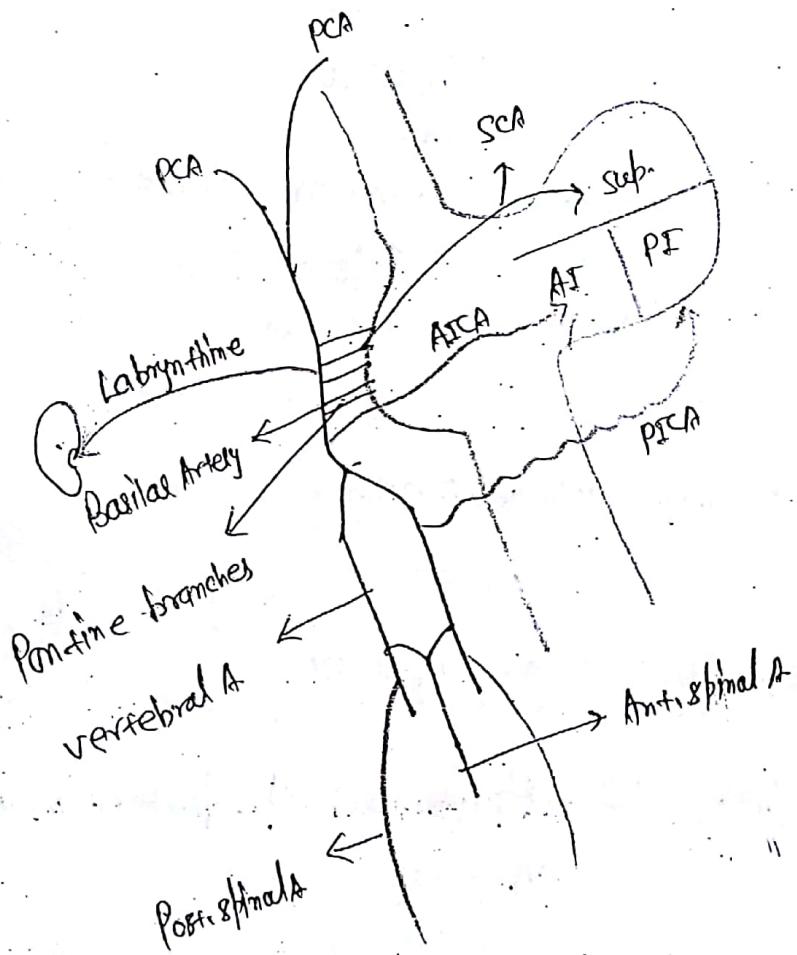
(B) Basilal Artery \Rightarrow Lies in Pons

branches \Rightarrow Pontine branches | Postomedian branches

supplies base of Pons \Rightarrow damage cause d/c

Hemiplegia

- Labrynthine artery
- Ant. Inferior cerebellar artery
- Superior cerebellar artery
- Post. cerebral artery



Internal carotid Artery

- Enters the skull through Foramen Lacerum

Branches ⇒

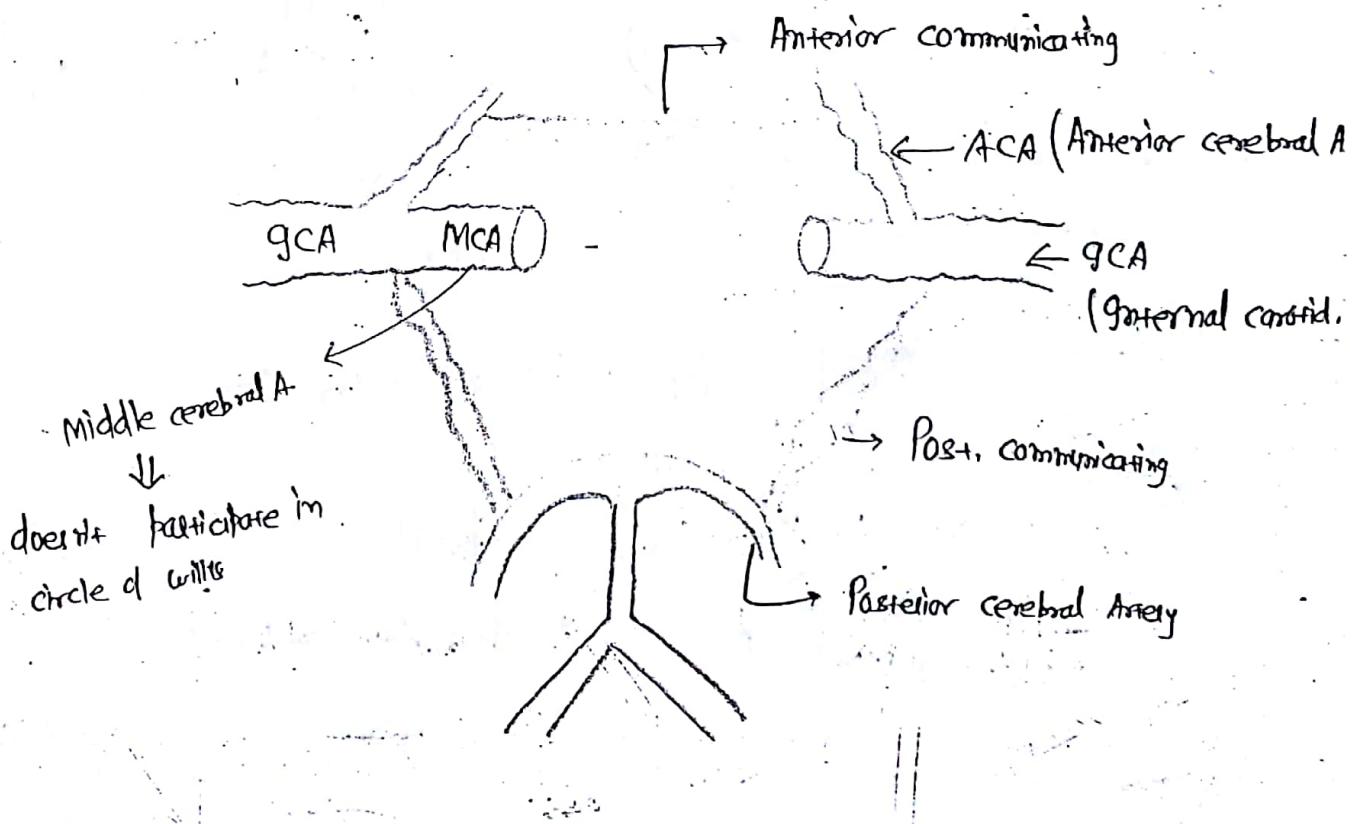
- ① cavernous branches
- ② Hypophyseal branches (to pituitary gland)
- ③ Ophthalmic Artery (passes through optic canal & optic nerve)
- ④ Ant. choroidal Artery
- ⑤ ... Post. communicating Artery
- ⑥ 2 terminal branches

Ant. cerebral A.

Middle cerebral A.

↳ Continuation of Internal carotid

Circle of Willis

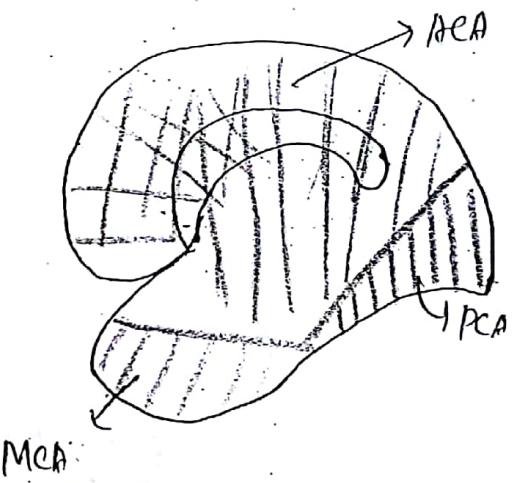
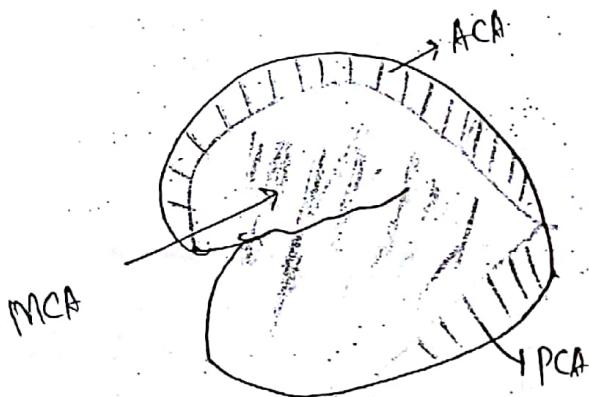


Circle of Willis

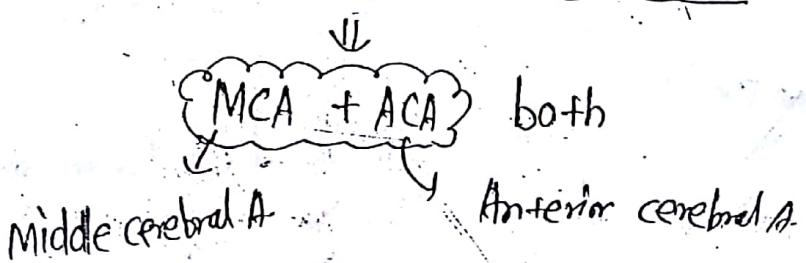
Cortical branches

Central branches

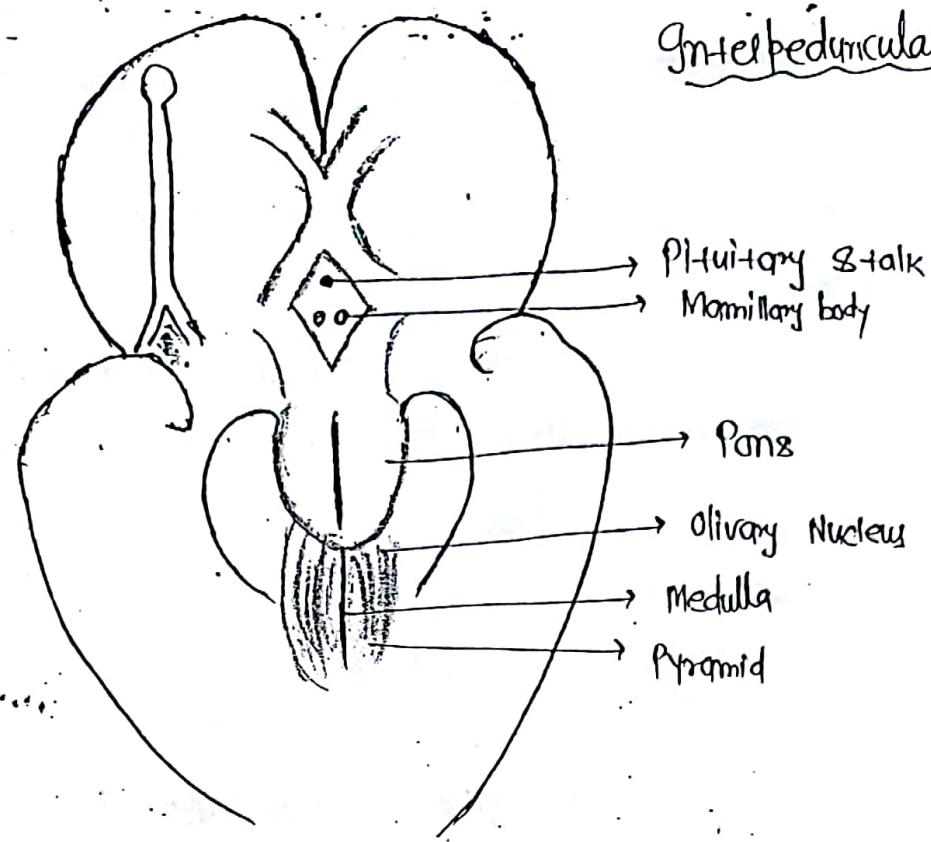
- enter the sulci to supply surfaces of the brain
- Artery \oplus nt in Lateral Sulcus \Rightarrow MCA (Middle cerebral A)
- Artery \oplus nt in callosal sulcus \Rightarrow ACA (Anterior cerebral A)



Blood supply of Motor/sensory Area



Gnathopetaluncular Fossa



Boundaries ⇒ Anterolateral ⇒ optic tract
Postero lateral ⇒ crus cerebri
Floor ⇒ Pituitary Stalk; Mamillary body & Posterior perforated substance

Content ⇒ 3rd Nerve & circle of Willis

VENOUS DRAINAGE OF BRAIN

1. Superficial vein \Rightarrow Superior cerebral vein



drains lateral surface of the brain &
they open into the superior sagittal
sinus.

Inferior cerebral vein



drains the inferior surface of the brain &
they open into the cavernous sinus & sigmoid
sinus.

Anterior cerebral vein



Lies in the callosal sulcus along \cong Anterior
cerebral artery

Middle cerebral vein



Superficial Middle cerebral



communicates Medially \cong
cavernous sinus & laterally
 \cong Superior sagittal & transverse
sinus

Deep Middle cerebral



Lies deep in the lateral sulcus
along \cong MCA

Anterior cerebral ; the deep
middle cerebral & straight veins
join to form basal vein.



Drains into Great cerebral
vein of Galen

2. Deep vein \Rightarrow

Internal cerebral vein



- Formed \textcircled{a} at interventricular foramen by joining
 - of T - Thalamostriatal vein
 - C - Choroidal vein
 - S - Septal vein
- The two Internal cerebral veins join to form
Great cerebral vein of Galen
 - ↳ drains into straight sinus
- The Basal vein drains into Great cerebral vein.

THE BRAIN

IVth ventricle

Roof \Rightarrow Formed by cerebellum

Floor \Rightarrow Lower half of the pons & upper half of the Medulla

Facial colliculus \Rightarrow Formed by fibres of Facial Nerve as they wind around the Abducent Nerve Nucleus

Hypoglossal A \Rightarrow Formed by hypoglossal Nerve Nucleus

Vagal A \Rightarrow Formed by dorsal Nucleus of vagus

BRAIN STEM

- only cranial Nerve ; which emerges from dorsal aspect of brain stem

↓
Trochlear (Rhineft cranic
Nerve)

- The Nerve which undergo complete decussation before emerging

↓

Trochlear Nerve

- Pregangl Nerve \Rightarrow Nerve having artery within it.

↳ eg \Rightarrow Optic Nerve \Rightarrow contains central A. of Retina

Sciatic Nerve \Rightarrow branch of inferior gluteal

* Medial Most N. attached to Ponto-Medullary Junction \Rightarrow

* Lateral Most

Nerve attach @ the junction of Pons & Middle cerebral Peduncle

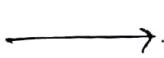
↓
Trigeminal Nerve.

FUNCTIONAL COMPONENTS OF NUCLEUS

① Special visceral efferent ↳

Nerves

5



Motor Nucleus of Trigeminal Nerve

7

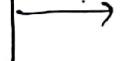


Motor Nucleus of Facial Nerve

9



10



Nucleus Ambiguous

11

② General visceral efferent ↳

Nerves

3



Edinger-Westphal Nucleus

7



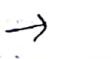
Sub. salivatory & Lacrimal

9



Inf. salivatory

10



Dorsal Nucleus of vagus

③ General Somatic afferent \rightarrow

Nerve

3



Nucleus

occulomotor N. Nucleus

4



Trochlear N. Nucleus

6



Abducens N. Nucleus

12



Hypoglossal N. Nucleus

④

Special visceral Afferent \rightarrow

⑤ In 7, 8 & 10th Cranial Nerve



Nucleus of tractus solitarius

⑤

General visceral Afferent \rightarrow

10th Nerve (vagus);

⑥

Special somatic Afferent \rightarrow present in

1st C.N.

2nd C.N.

8th C.N.

⑦

General somatic afferent \rightarrow carried by trigeminal Nerve:-

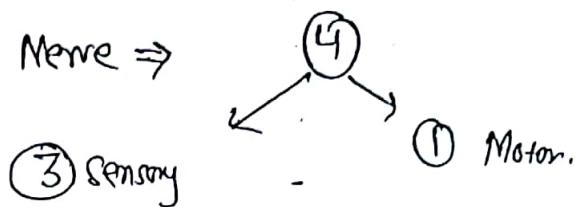
its three nuclei \rightarrow (a) Mesencephalic Nucleus

\hookrightarrow part in Midbrain

b) chief sensory Nucleus → prt. In Pons

c) spinal Nucleus → prt. in Medulla.

No. of Nucleus of Trigeminal Nerve ⇒



WHITE MATTER OF THE BRAIN

Commissural fibres

- Connects similar areas in the opposite hemisphere

eg ⇒ Corpus callosum

Ant. commissure

Post. commissure

Hebenular commissure

Projection fibres

- they project outside the brain

eg ⇒ Internal capsule

Association fibres

- connect different area in same hemisphere

eg ⇒ Uncinate fasciculus

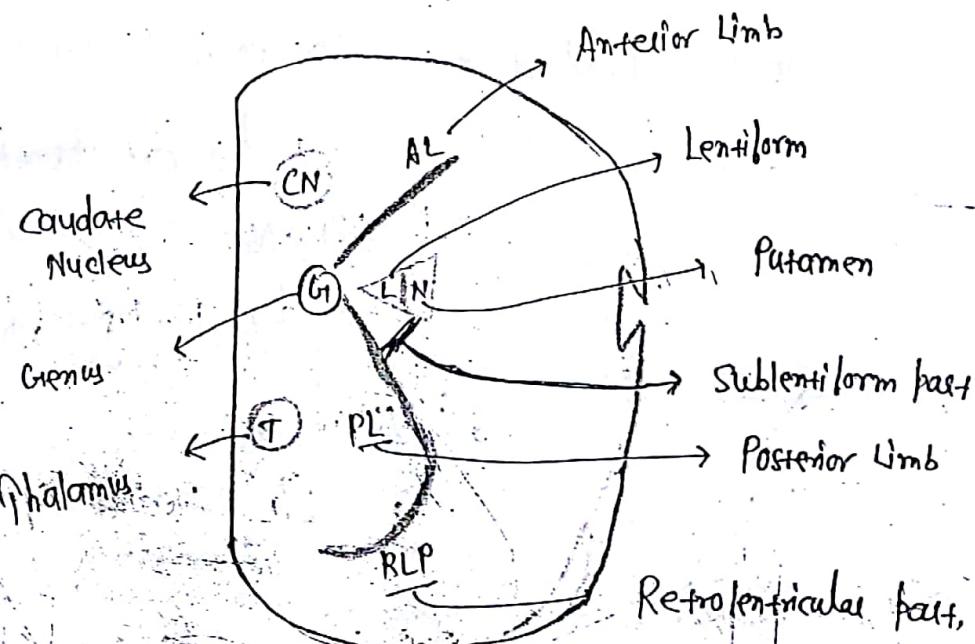
INTERNAL CAPSULE

Parts ↗

- Anterior Limb (Lies b/w caudate Nucleus & Lentiform Nucleus)
- Genu
- Posterior Limb. (Lies b/w the thalamus & Lentiform Nucleus).
- Retrolentiform part ; lies behind Lentiform Nucleus
- Sublentiform part ; lies below Lentiform Nucleus

AL	G	PL	RLP	SLP
Ascending fibres	Thalamo- frontal	Thalamo- Parietal	Thalamo- occipital (Optic Radiation)	Thalamo- temporal (Auditory Radi:
Descending fibres	Fonto- Pontine	Cortico- Nucleus	Cortico- Spinal	Occipito- Pontine
				Temporo- Pontine

* Main A. Supplying the Internal capsule ⇒ Middle cerebral



* Medial Medullary Syndrome | Alternating
Hyoglossal hemiplegia

- Thrombosis of Vertebral Artery;
- Structures involved → Hyoglossal Nucleus
 - ↳ I/L Paralysis of Tongue
 - ↳ corticospinal tract
 - ↳ c/l hemiplegia
- Medial Lemniscus
 - ↳ c/l Loss of Fine sensation,

* Milard - Grubler syndrome

- Thrombosis of Palamedian branches of basilar arteries;
- Structures involved → corticospinal tract
 - ↳ c/l hemiplegia
- 7th Nerve
 - ↳ I/L Paralysis of Face
- 6th Nerve
 - ↳ I/L Medial squint.

WEBER's SYNDROME

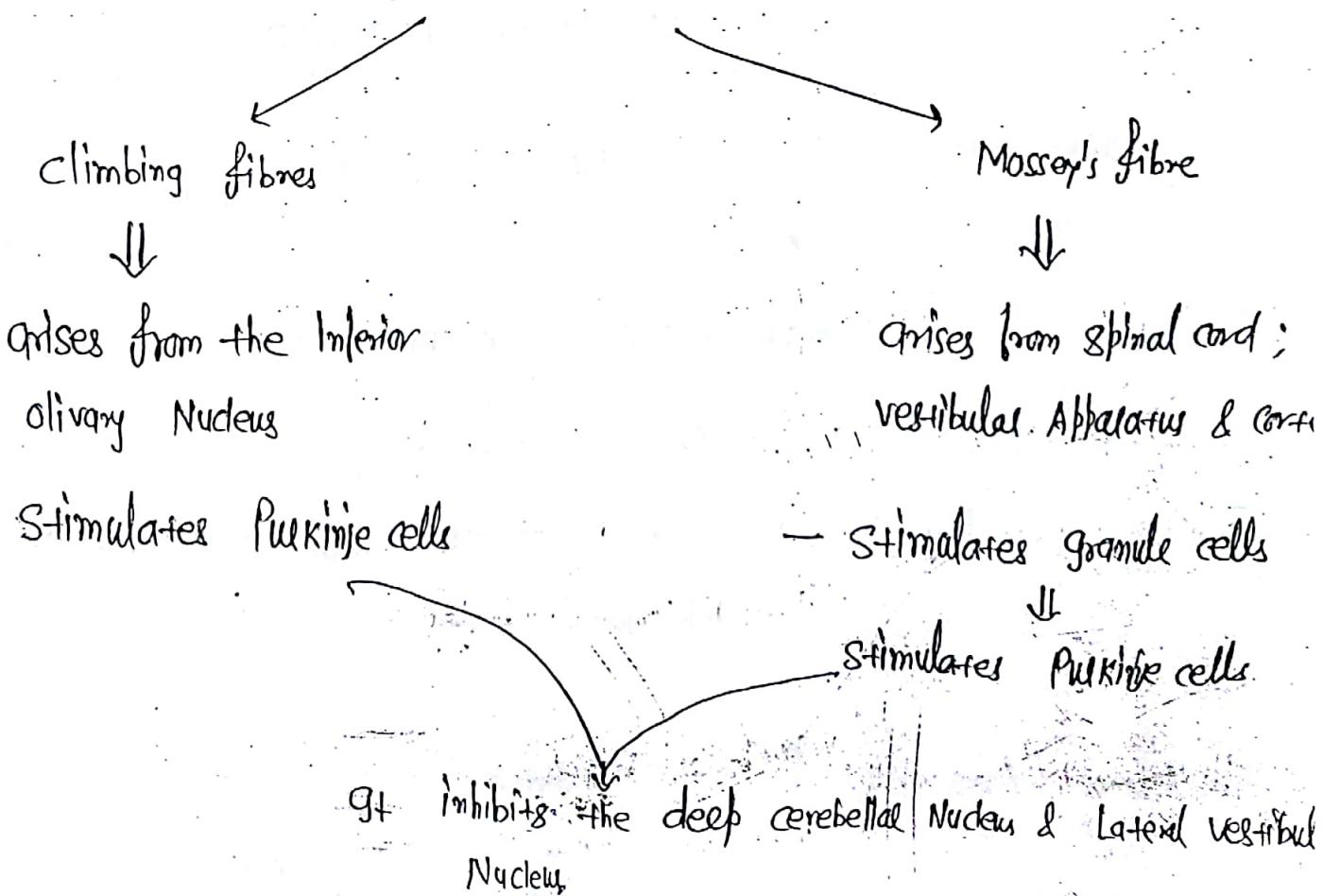
- Thrombosis of Post. cerebral Artery.

Structures Involved \Rightarrow ① cortico-spinal tract
 \hookrightarrow CL Hemiplegia

② 3rd Nerve
 \hookrightarrow IL Lateral squint & Dilatation of pupil;
Ptosis;
Pupil is dilated & fixed.

CEREBELLUM

- * Fibres coming to the cerebellum



INFERIOR CEREBELLAR PEDUNCLE

Afferent fibres → Posterior spinocerebellar;

olivo - cerebellar;

vestibulo - cerebellar;

Reticular - cerebellar;

cuneo - cerebellar (carries Unconscious proprioception from upper limb)

Efferent fibres → Cerebello - Vestibular

Cerebello - Reticular

Cerebello - olivary

MIDDLE CEREBELLAR PEDUNCLE

Afferent fibres → Ponto - cerebellar

SUPERIOR CEREBELLAR PEDUNCLE

Afferent fibres → Ant. spinocerebellar

tecto - cerebellar

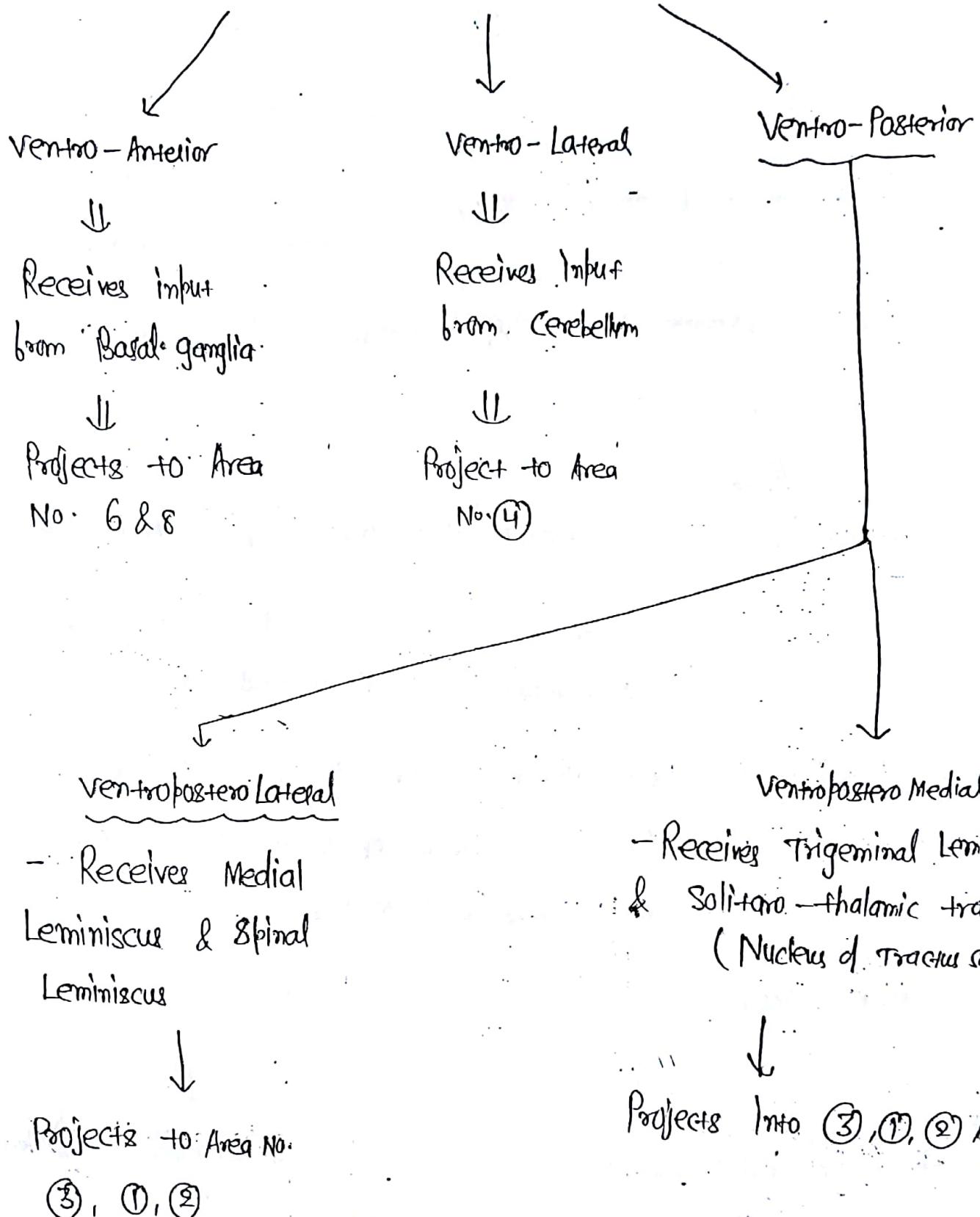
Hypo thalamo - cerebellar

Efferent fibres → Cerebello - Rubral

Gentato - Rubral & Dentato - thalamic

THALAMUS

Ventral group of Nucleus



* SPINAL CORD

DORSAL HORN :

Substantia Gielatinosa : 2nd order Neuron for crude sensation;

Nucleus Proprius : Receives conscious Proprioception;

Nucleus dorsalis | Clarke's column : Receives Unconscious Proprioception from trunk & lower limb;

Visceral Afferents : Receives sensation from visceral organs.

VENTRAL HORN :

Medial group : innervates the muscle of the neck & the trunk

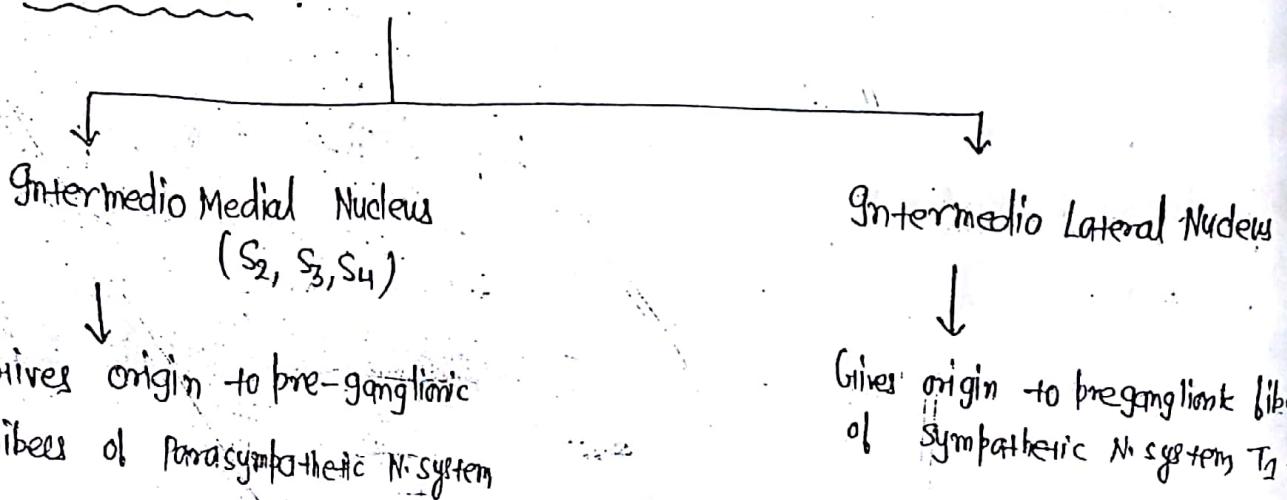
Lateral group : present in the cervical & lumbosacral enlargement of the spinal cord

Central group : a) Phrenic Nerve Nucleus = C₃ - C₅

b) Spinal Nucleus of Accessory Nerve = C₁ - C₅

c) Lumbosacral Nucleus

LATERAL HORN :



REXED LAMINA

- System of ten layers of grey matter.

1 → Postero marginal Nucleus

2 → Substantia Gelatinosa

3 & 4 → Nucleus Proprius

5 & 6 → Base of dorsal column

7 → Nucleus dorsalis; Nucleus of Lateral horn

8 & 9 → Nuclei of Anterior grey column

10. → Surrounds the central canal.

* HEUBNER's Artery \Rightarrow Recurrent branch of Anterior cerebral;

* CHARCOT's Artery \Rightarrow Striate branch of Middle cerebral

NEET'16
The cerebral cortex contains 5 types of Neurons \Rightarrow

i) Purkinje cells

ii) Granule cells

iii) Basket cells

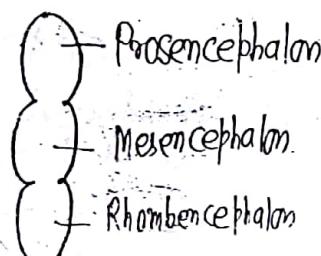
iv) Stellate cells

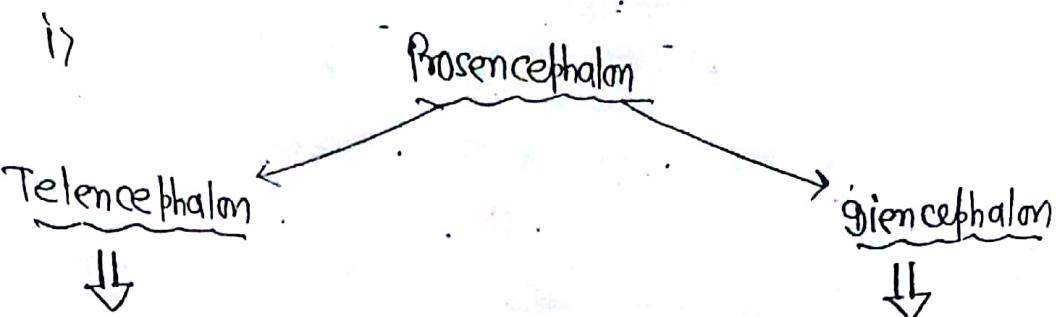
v) Golgi cells

DEVELOPMENT OF BRAIN

Structures formed from Neural tube are \Rightarrow

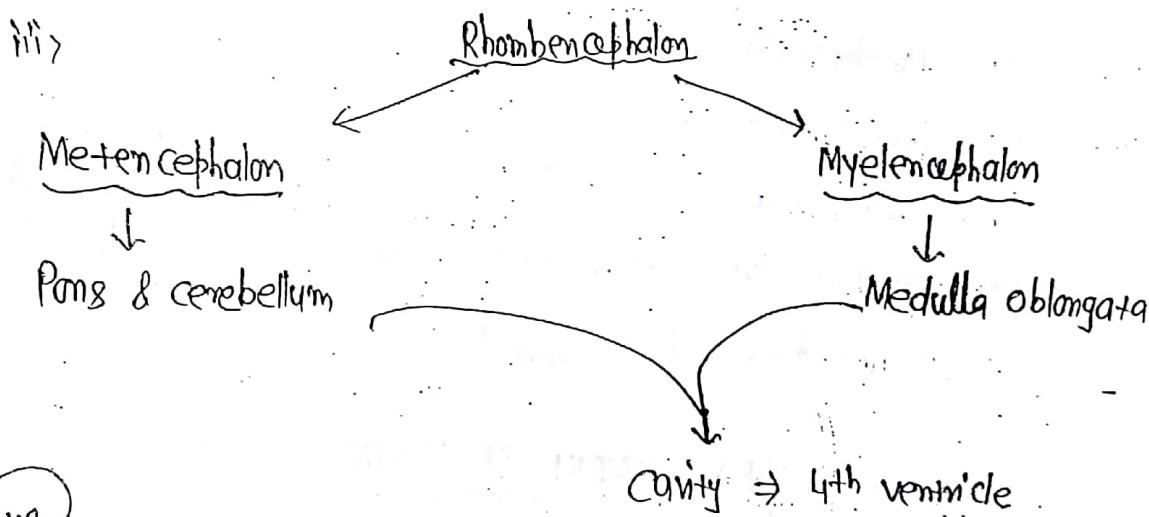
(A) From cranial part of Neural tube \Rightarrow Give rise to "Brain"





- Cerebral Hemisphere
- Cavity → (Lateral ventricle)

- Thalamus
- Hypothalamus
- Epithalamus
- Metathalamus
(Medial geniculate body)
(Lateral geniculate body)
- Sub-thalamus
- Cavity ⇒ 3rd ventricle

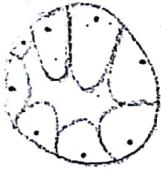


NEET 113
⑥

From caudal part of Neural tube → Gives "rise to" "spinal cord".

- * Cell Nest is characterized of \Rightarrow Hyaline cartilage
- * Largest size of chondrocytes are seen in \Rightarrow Elastic cartilage
- * Smallest size of chondrocytes are seen in \Rightarrow White fibrocartilage
 eg \Rightarrow Intervertebral disc
 Articular disc
 Menisci

- * Apocrine gland \Rightarrow eg \Rightarrow Sweat gland
 Holocrine gland \Rightarrow eg \Rightarrow Sebaceous gland
 Merocrine/eccrine gland \Rightarrow eg \Rightarrow Mammary gland
- * eg of Serous Salivary gland \Rightarrow eg \Rightarrow Parotid gland
 Mucous Salivary gland \Rightarrow eg \Rightarrow Sublingual gland
 Mixed salivary gland \Rightarrow eg \Rightarrow Submandibular gland



MUCOUS ACINUS



SEROUS ACINUS



MIXED ACINUS (Demilune)

- * Lymphoid follicles are abt. in \Rightarrow Thymus
 \Downarrow
 Hassell's corpuscles are characteristic of it.
- * Spleen contain Red & white pulp \in eccentric Arteriole.
- * Tonsil contains crypts & epithelium is "Stratified Squamous Non-karatinized epithelium".
- * Lymph Node \Rightarrow Subcapsular sinus
- * Gall bladder \Rightarrow simple columnar \in brush border.
- * PCT \Rightarrow Lined by simple cuboidal \in brush border
- Ansa Nephron \Rightarrow Lined by simple squamous epithelium,
 (Loop of Henle)
- * Goblet cells are abt. in \Rightarrow Esophagus
 \Downarrow
 plenty in colon
- Submucosal glands \Rightarrow Lubricates the esophagus
- * Toughest Layer of esophagus \Rightarrow Submucosa
- * Lining epithelium of secreting thyroid follicle \Rightarrow Simple cuboidal.
- * Germinal epithelium \Rightarrow simple cuboidal
- * Respiratory epithelium \Rightarrow Pseudo stratified ciliated columnal \in goblet cells
- * Internal elastic lamina \Rightarrow characteristics of Muscular Artery.

TYPE OF EPIPHYSIS

Part of bone which develop from?

1. Pressure epiphysis ⇒ Seen @ - ossification center.

- the ends of long bone subjected to pressure

↳ eg ⇒ Head of Humerus; ♀

Head of Femur; ♀

Condyles of tibia; ♀

2. Traction epiphysis ⇒ Form distal pull of the Muscle

↳ eg ⇒ Tuberole; ♀

Trochanter; ♀

Mastoid process; ♀

Tibial tuberosity.

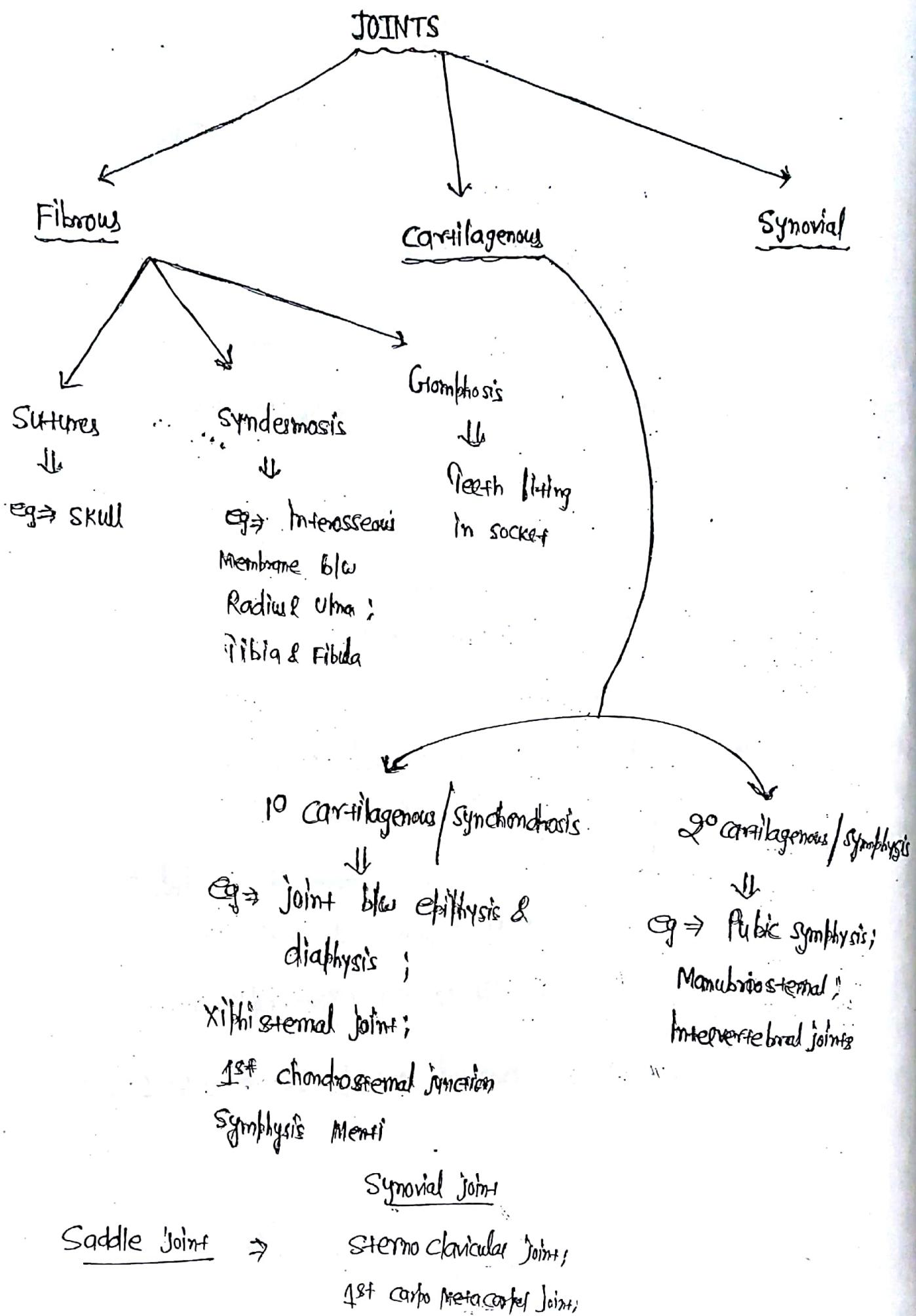
3. Atavistic epiphysis ⇒ Functional in Lower Animals & degenerate
in humans

↳ eg ⇒ Coracoid process of Scapula ♀

• OS trigonum of Talus

4. Aberrant epiphysis ⇒ It is an extra epiphysis

↳ eg ⇒ Proximal end of 1st Metacarpal bone ♀



Condylar Joint \Rightarrow TM Joint; Atlanto-occipital joint;
Metacarpopharyngeal Joint

ellipsoidal Joint \Rightarrow Wrist

Pivot Joint \Rightarrow Superior & Inferior Radio-ulnar joint;
Atlanto-axial joint

Plane Joint \Rightarrow Intercarpal; Inter-tarsal; Acromio-clavicular

Hinge \Rightarrow Elbow; Ankle

